

COVID-19: Preventing Future Pandemics

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ABSTRACT

The COVID-19 pandemic has had global health and economic adverse impacts. The main measures being taken to control the spread of SARS-CoV-2 (the virus associated with COVID-19) are conceptually those that were taken to control the spread of SARS-CoV in the previous coronavirus-driven pandemic of 2002-2003: good hygiene, facemasks, and quarantine (lockdown). The difference is the larger scale of these measures for SARS-CoV-2.

A weakened immune system appears to be the main determinant of serious/fatal reaction to viral infection (for COVID-19, SARS, and influenza alike). There are four major approaches being employed or considered presently to augment or strengthen the immune system, in order to reduce adverse effects of viral exposure. The three approaches that are mainly focused on augmenting the immune system are based on the concept that pandemics can be controlled/prevented while maintaining the immune-weakening lifestyles followed by much of the global population. The fourth approach is based on identifying and introducing measures aimed at strengthening the immune system intrinsically in order to minimize future pandemics.

The four measures are: 1) restricting exposure to virus; 2) providing reactive/tactical treatments to reduce viral load; 3) developing vaccines to prevent, or at least attenuate, the infection; 4) strengthening the immune system intrinsically, by a) identifying those factors that contribute to weakening the immune system, then eliminating/reducing them as comprehensively, thoroughly, and rapidly as possible, and b) replacing the eliminated factors with immune-strengthening factors.

The present monograph focuses mainly on strengthening the immune system intrinsically. It identifies many hundreds of factors that contribute to weakening the immune system, as well as measures that can strengthen it. It also addresses the vaccine issue, since vaccine development has been emphasized in myriad forums. Potential mid-and long-term adverse vaccine effects that cannot be identified in short-term tests characteristic of efficacy testing are identified. To ensure safety, long-term testing under real-life conditions (exposures to multiple toxic stimuli) is required. There is an incompatibility between the accelerated vaccine development times being pursued by government and industry and the long times required for validation of vaccine safety.

In summary, 1) there is not unanimity within the medical community for continuing post-lockdown severe restrictions on activities of the vast majority of the total population that are mainly applicable to the most vulnerable very small minority of the total population; 2) repurposed (mainly) antiviral treatments can only be expected to have very limited results in controlling SARS-CoV-2 viral load of the most severely impacted, based on trials conducted so far; 3) it is difficult to see how safe COVID-19 vaccines can be developed and fully tested on time scales of one or two years, as proposed presently; 4) the only real protection against a future COVID-19 pandemic or any other viral pandemic is the one that was demonstrated to work in the SARS pandemic, the MERS pandemic, the COVID-19 pandemic, and in the annual influenza pandemics: a healthy immune system capable of neutralizing incoming viruses as nature intended. We need an Operation Warp Speed (a USA Federal Administration effort currently targeted to produce a vaccine in a record short time period) to identify and eliminate those factors that weaken the immune system as thoroughly, comprehensively, and rapidly as possible!

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CHAPTER 1 - INTRODUCTION

1A. Background

Over the past two decades, there have been at least three major coronavirus-based infectious disease outbreaks/epidemics/pandemics: Severe Acute Respiratory Syndrome (SARS), 2002-2003; Middle East Respiratory Syndrome (MERS), starting in 2012; COVID-19, starting in December 2019. There are a number of similarities among these three infectious diseases, including abnormal values of selected biomarkers (e.g., neutrophils, lymphocytes, albumin, CRP, TNF-alpha, etc.), pulmonary inflammation, pulmonary damage. The most important similarity among these infectious diseases is the demographic affected most severely. These tend to be the elderly, with comorbidities and weakened immune systems, and others with weakened immune systems [1-11].

There are also similarities of COVID-19 with influenza: “Both (COVID-19 and influenza) cause fever, cough, body aches and fatigue; sometimes vomiting and diarrhea; can be mild or severe, even fatal in rare cases; can result in pneumonia” (<https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/coronavirus-disease-2019-vs-the-flu>). Additionally, “Neither virus is treatable with antibiotics, which only work on bacterial infections; both are treated by addressing symptoms, such as reducing fever; severe cases may require hospitalization and support such as mechanical ventilation”.

How do COVID-19 and influenza compare in number of fatalities? According to the above link (and other supporting references), for influenza, the estimate is “1 billion cases worldwide; 9.3 million to 45 million cases in the U.S. per year”, accompanied by “291,000 to 646,000 deaths worldwide; 12,000 to 61,000 deaths in the U.S. per year”. For the previous coronavirus-based outbreaks/ epidemics/ pandemics, these cases/fatalities numbers have been orders of magnitude less than the influenza numbers. The SARS pandemic involved about 8,000 people who presented with SARS symptoms, of whom ~800 died [12-13]. The MERS epidemic involved ~2,500 cases, with almost 900 deaths (<http://www.emro.who.int/pandemic-epidemic-diseases/mers-cov/mers-situation-update-january-2020.html>). For COVID-19 (as of 8 June 2020): “There have been approximately 403,267 deaths reported worldwide. In the U.S, 110,514 people have died of COVID-19”, according to the Hopkins link above. The validity of these numbers will be addressed in [Appendix 2](#)

The main measures being taken to control the spread of the SARS-CoV-2 coronavirus (responsible for COVID-19) are conceptually those that were taken to control the spread of the SARS-CoV coronavirus in 2002-2003: good hygiene and quarantine (lockdown). The difference is the scale of these measures. Currently, many countries are on lockdown (at different levels of severity), restricting many activities and businesses that involve gatherings of large numbers of people in close proximity. As of early June, 2020, it is unknown how long these restrictions will be in place.

1B. Treatments

The measures proposed in this monograph to prevent future pandemics are targeted towards the larger population in general, and towards the most vulnerable demographic in particular. As stated above, this vulnerable demographic consists of “elderly, with comorbidities and weakened immune systems, and others with weakened immune systems”. While there is some decline in the immune system with age, *comorbidity is a better predictor of impaired immunity*, than chronological age, in older adults [14-15].

Comorbidity in common usage is typically used to mean other diseases. From the perspective of our past studies aimed at preventing and reversing chronic diseases [16], each of these diseases is a proxy for the hundreds of foundational factors that contribute to its development (e.g., smoking, excess alcohol, pesticides, high fat diet, PFOS (Perfluorooctanesulfonic acid), PFAS (Per- and polyfluoroalkyl substances), etc.). In other words, the foundational contributing factors to the disease can be viewed as the true independent variables (over which the individual and/or the government have some measure of control), and the disease is the dependent variable. Thus, if we switch co-ordinate systems from diseases to foundational contributing factors, we could then state that the main demographic that succumbed to both SARS and COVID-19 had/were exposed to high numbers of foundational contributing factors to disease.

This parallels the experience with influenza: “Comorbidities are really what put people at the highest risk of complications from influenza. Asthma, chronic obstructive pulmonary disease (COPD), other pulmonary conditions, even heart conditions, and the immunocompromised population, all of these patients are at a significantly higher risk of complications from influenza than the general population” [<https://www.contagionlive.com/news/us-flu-cases-reach-32-million-pediatric-hospitalization-rates-hit-record-high>]. The most vulnerable demographic of these lethal infectious diseases having high numbers of foundational contributing factors to disease is the key point that underlies the approach in this monograph to prevent future pandemics!

In the current COVID-19 pandemic, we see some commonalities with what happened in the SARS pandemic. Most of the deaths in both cases resulted from pneumonia. Most (not all) of the deaths are among the elderly, and appear to be most prevalent among those with high comorbidities and weakened immune systems. Switching co-ordinate systems in our description, most of the fatalities are among those exposed (over their lifetime, as well as currently) to large numbers of contributing factors to disease and/or those with weakened immune systems.

The contributing factors to disease also trigger a positive feedback mechanism. The contributing factors weaken the immune system (as the results of the present study will show), which in turn increases vulnerability to infection. Infections, in turn, weaken the immune system further, which again enhances vulnerability to infection. The intervention under our control to disrupt this feedback loop is to reduce/eliminate the contributing factors to a weakened immune system.

1C. Treatment Definition

Given that weakened immune systems increase vulnerability to infectious diseases, and especially to the worst outcomes of infectious disease, then *preventing future pandemics requires adopting measures that will strengthen the immune system*. There are two main options to strengthen the immune system. One is vaccines, and this is discussed in more detail in [Appendix 3](#). The other option is to remove those exposures and behaviors that weaken the immune system, and, in some cases, replace them with exposures and behaviors that strengthen the immune system. The latter approach is termed ‘strategic’ treatments [17]. The following section will define strategic treatments, and place them in the larger treatment context.

If treatments are defined as a set of actions that improve health, then (at least) two types of treatments are possible [17]. The first type can be defined as positive treatments. They can be subdivided into high-tech treatments and low-tech treatments. The high-tech are the classical treatments

where drugs (or supplements) and/or radiation and/or surgery are implemented, and symptoms are alleviated. These high-tech positive treatments are basically a reactive tactical response to abnormal markers of health. They can be applied for the short-term (e.g., antibiotics for bacterial infections, antivirals for viral infections, etc.), or for the long-term (e.g., statins, blood thinners, antihypertensives, etc.). The low-tech treatments involve dietary, sleep, and other behavioral changes shown to impact the immune system positively (see section A4-C for a brief bibliography of low-tech treatments). For long-term benefit, these low-tech treatments need to be maintained indefinitely. On average, the high-tech treatments have greater risk than the low-tech treatments.

The second type can be defined as negative-negative treatments, where those factors that contribute to disease are first identified and then removed. The name derives from the mathematics world, where a negative of a negative is a positive. These negative-negative treatments are basically a proactive strategic response to abnormal markers of health, and typically involve long-term changes in lifestyle and harmful exposures for improved health.

1D. Tactical Treatments

Much of the effort to help the most vulnerable demographic at this time has been searching for, and experimenting with, treatments that were/are used to combat other (mainly) viral diseases. As of 8 June 2020, 233 treatments are under consideration (and 161 vaccines are in development) [<https://milkeninstitute.org/covid-19-tracker>]. These treatments include, but are not limited to:

Actemra/Tocilizumab; Avigan/Favipiravir; Azithromycin; Baricitinib/Olumiant; Bevacizumab/Avastin; Calquence/Acalabrutinib; Chloroquine; Colcrys/Colchicine; Convalescent Plasma; EIDD-2801; Fingolimod/Gilenya; Galidesivir; Hydroxychloroquine; Ilaris/Canakinumab; Ivermectin; Jakafi/Ruxolitinib; Kaletra/Lopinavir/Ritonavir; Kevzara/Sarilumab; Kineret/Anakinra; Leronlimab; Mavrilimumab; Methylprednisolone; Olumiant/Baricitinib; Otezla/Apremilast; Remdesivir; Tamiflu/Oseltamivir; Umifenovir/Arbidol; Xeljanz/Tofacitinib [<https://milkeninstitute.org/covid-19-tracker>; <https://www.drugs.com/condition/covid-19.html>; <https://www.goodrx.com/blog/coronavirus-treatments-on-the-way/>].

Other novel treatments could be identified using our Literature-Related Discovery and Innovation (LRDI)-based treatment repurposing methodology [18].

1E. Strategic Treatments

Strategic treatments are the focus of this monograph. Their identification is a two-step process. First, markers of immune system health (ranging from specific biomarkers to more general descriptors) are selected. Second, those substances (e.g., smoking, excess alcohol, pesticides, etc.) behaviors (e.g., sedentary lifestyle, substance abuse, etc.), etc., that degrade the levels of these markers (i.e., lead to immune dysfunction, immunotoxicity, immunosuppression, etc.) are then identified and recommended for elimination. The strategic treatments identified in the present study are those contained within the immune system core literature (defined in [Chapter 2](#)). Additional novel strategic treatments could also be identified using our LRDI-based treatment repurposing methodology [18].

1F. Reactive Tactical vs Proactive Strategic Treatments

The reactive tactical treatment approach for countering infections from viral exposure improves biomarker levels and reduces symptoms (if successful), but ordinarily does little to improve the body's resistance to disease. For viral infections, the tactical treatments will do little to strengthen the weakened immune (and other) system. After tactical treatments for one viral infection, people with weakened immune systems will again be vulnerable to serious infectious consequences from exposure to the next harmful virus they encounter.

The proactive strategic treatment approach will strengthen the immune (and other) system by removing those critical factors that contribute to disease and a weakened immune system (unless irreversible damage has been done to the immune system, or individuals possess congenital or other hereditary damage to their immune system). These strategic treatments tend to require long-term adherence by their recipients. In turn, these recipients of strategic treatments will be less vulnerable to infection from exposure to the next harmful virus they encounter (SARS-CoV-2 or otherwise). Like many healthy people who were exposed to SARS-CoV and SARS-CoV-2, these people who follow the (typically) long-term proactive strategic treatment regimen successfully may not even be aware they have been exposed to, or infected by, the coronavirus. The only indication of their infection will be coronavirus antibodies in their serum.

1G. Structure of Monograph

The remainder of this monograph is structured as follows. [Chapter 2](#) presents the Methodology used to identify the strategic treatments for strengthening the immune system. [Chapter 3](#) presents the Results of the study, including Discussion and Conclusions. [Chapter 4](#) contains the References.

[Appendix 1](#) frames the role of viruses in the much larger context of their place in the ecosystem. [Appendix 2](#) addresses the nature of viral pandemics, accuracy of numbers of COVID-19 deaths, and financial incentives for over-reporting COVID-19 cases and deaths. [Appendix 3](#) addresses the prospects for a COVID-19 vaccine. [Appendix 4](#) contains the complete list of contributing factors to a weakened immune system identified in this study, a limited bibliography of source records for these contributing factors, and a limited bibliography of (mainly low-tech) factors that contribute to strengthening the immune system.

1H. Economic Aspects

We end this Introduction with a brief discussion of economic aspects of response to the COVID-19 pandemic, or any future viral pandemic. As the previous sections have shown, there are two general types of responses (tactical/reactive and strategic/proactive), and these can be done in parallel in the short-term. For the long-term, realistically, emphasis would have to be placed on one or the other.

1H1. Reactive approaches

First are the (mainly) tactical/reactive approaches to reduce viral loads/augment the immune system with the aid of exogenous measures (quarantine, newly developed treatments, repurposed treatments, vaccines, etc), and second are the (mainly) strategic approaches to strengthen endogenous immune defenses to neutralize the viral exposures.

Two types of costs are associated with each response: short/long-term investments, and revenues/economic activities lost. For the tactical approaches, the investment component is the cost of developing, testing, manufacturing, and distribution of (mainly) new/repurposed drugs and vaccines. It is difficult to find accurate estimates of such costs, but given stated commitments by some governments and some industries, the costs will be over twenty billion dollars (USD), and perhaps well over that amount (<https://www.reuters.com/article/us-health-coronavirus-eu-virus/world-leaders-pledge-8-billion-to-fight-covid-19-but-us-steers-clear-idUSKBN22G0RM>; https://cepi.net/news_cepi/2-billion-required-to-develop-a-vaccine-against-the-covid-19-virus-2/; <https://www.sciencemag.org/news/2020/06/nih-grapples-researchers-rush-claim-billions-pandemic-research-funds>; <https://www.statnews.com/pharmalot/2020/05/21/astrazeneca-covid19-coronavirus-vaccine-barda/>; <https://techcrunch.com/2020/03/30/johnson-johnson-partners-with-barda-to-fund-1-billion-in-covid-19-vaccine-research/>; <https://www.reuters.com/article/us-health-coronavirus-moderna-funding/moderna-receives-483-million-barda-award-for-covid-19-vaccine-development-idUSKBN21Y3E0>).

The revenues lost are essentially the reduction in economic activity due to the global lockdowns. This number is equally difficult to estimate/predict, but losses of trillions of dollars, or perhaps tens of trillions over a five-year period, may be possible, based on some present predictions (<https://www.marketwatch.com/story/today-in-scary-numbers-pandemic-could-cost-global-economy-82-trillion-2020-05-19>). There are important costs/benefits associated with other aspects of the lockdown (lives lost from non-infectious causes (suicide, etc.), reduced carbon emissions, etc.), and these need to be considered in a more detailed cost/benefit study.

1H2. Proactive approaches

For the strategic/proactive treatment approaches, there may be added investment expenditures required if advanced technologies (and their adverse effects on health) are utilized less through stricter emissions regulations, and either no technologies or less efficient, but lower emissions, technologies are substituted in their place. We have seen no estimates of such added costs, mainly because little attention has been given to issues associated with implementation of the strategic treatment approaches.

The revenues lost from implementing the strategic treatment approaches derive from reduced economic activity resulting from eliminating/reducing harmful technologies. For example, wireless radiation technologies are forecast to generate trillions of dollars in potential revenue after implementation. Reducing radiation emission limits (by orders of magnitude to safe levels) for these technologies will translate into many of the wireless radiation applications not being feasible economically, and therefore not pursued. Given the sheer number of immune system-damaging technologies identified in the present monograph, and the added number that could be identified with a much larger study, the economic activity lost by reducing dependence on these technologies would easily be in the neighborhood of tens of trillions of dollars. To partially balance out those losses, lockdowns could conceivably be avoided if there were wide-scale strengthening of the public's immune systems, and the economic losses due to lockdown could be avoided.

Thus, for both the (mainly) tactical approaches, and the (mainly) strategic approaches, economic losses incurred – or avoided -- will be staggering, if the response to the present pandemic is any indication of response to future pandemics. The strategic approach offers the potential benefits of 1)

improved health and longevity by having a strengthened immune system and 2) reduced economic losses by avoiding future lockdowns. Additionally, because of the pervasive nature of many of the contributing factors to a weakened immune system (they are contributing factors to many other infectious and chronic diseases as well [16]), their elimination will result in reduced suffering from these myriad diseases and resulting further increased longevity. Choosing between these two approaches (for the longer-term) translates into a classic tradeoff between 1) improved health/longevity and 2) improved prosperity from implementing advanced, but also harmful, technologies!

CHAPTER 2 – METHODOLOGY

The main analytical objective of this study is to identify factors that contribute to weakening of the immune system. Toward this end, a query was generated that would retrieve records with high probability of containing such factors. The query retrieved 10,733 records from Medline. Some additional records (identified from those records retrieved with the query) were also used for the analysis. The retrieved records were inspected visually, and contributing factors were extracted manually. These contributing factors were then categorized according to a pre-existing taxonomy [19], and are presented summarily in [Chapter 3](#) and fully in [Appendix 4](#).

The query used to retrieve these records from SCI-Medline is shown boxed below.

FINAL QUERY USED FOR STUDY SCI-MEDLINE

```
MESH  (/adverse effects OR /toxicity OR /poisoning)
AND
TITLE  (immun* AND (expos* OR induc* OR exacerbat* OR aggravat* OR trigger* OR disrupt* OR
impair* OR dysfunction* OR suppress*))

OR

MESH  (/adverse effects OR /toxicity OR /poisoning)
AND
TITLE  immun*

AND

TOPIC  IMMUNOTOXIC*
OR
TITLE  IMMUNOTOXIC* OR IMMUN* NEAR/3 IMPAIR*
```

Initially, a much broader query was developed, and it retrieved tens of thousands of records. However, given that the projected analysis would be labor intensive, with visual inspection of the retrieved records and manual extraction of contributing factors, it was decided to generate a more focused query that would retrieve fewer records, but with higher probability of relevance (precision). The boxed query achieved that goal.

CHAPTER 3 – RESULTS, DISCUSSION, AND CONCLUSIONS

Approximately 65% of the retrieved records were evaluated. The extracted contributing factors were assigned to one of five categories (Lifestyle, Iatrogenic, Biotoxin/Biomaterial, Occupational/Environmental, Psychosocial/Socioeconomic); many of the contributing factors could have been assigned to multiple categories. In future studies, other categorizations may provide further insights. Table 3-1 contains contributing factors that have been shown repeatedly (appeared with high frequency in the database) to weaken the immune system. They include:

TABLE 3-1

HIGH-FREQUENCY CONTRIBUTING FACTORS TO WEAKENED IMMUNE SYSTEM

CATEGORY	CONTRIBUTING FACTOR
LIFESTYLE	smoking, excess alcohol, substance abuse, high-fat diet, protein-deficient diet, high-cholesterol diet, Western-style diets, chronic sleep restriction, etc.
IATROGENIC	immunosuppressive drugs, gamma radiation treatments, nanomedicinal products, adjuvanted vaccines, acetaminophen, non-steroidal antiinflammatory drugs (NSAIDs), surgical stress, serotonin reuptake inhibitors, selected anesthetics, selected antibiotics, highly active antiretroviral therapy drugs, etc.
BIOTOXIN/ BIOMATERIAL	aflatoxin, ochratoxin, T-2 toxin, anatoxin-A, mycotoxins, microcystin-LR, dietary toxic cyanobacteria, yessotoxin, scorpion venom; <i>Streptomyces californicus</i> ; <i>Pseudomonas aeruginosa</i> ; Rhinovirus, respiratory syncytial virus, etc.
OCCUPATIONAL/ ENVIRONMENTAL	microplastics, endocrine-disrupting chemicals, heavy metals, pesticides/insecticides/herbicides, nanoparticles, perfluorooctanoic acid (PFOA), polychlorinated biphenyls (PCBs), polyaromatic hydrocarbons (PAHs), perfluorooctanesulfonate (PFOS), fine particulate matter, air pollution, acrylamide, aromatic halogenated disinfection byproducts, benzene, benzo(a)pyrene, crude oil, corexit, ultraviolet (UV) radiation, wireless radiation-cell phones/cell towers/WiFi, sodium fluoride, etc.
PSYCHOSOCIAL/ SOCIOECONOMIC	depression, chronic stress, restraint stress, social isolation, stressful life events, childhood adversity, etc.

Eliminating/ameliorating these toxic exposures/behaviors will require a combination of individual motivations/efforts and government efforts, especially at the regulatory level. The factors in the Lifestyle category mainly require motivation and willpower to eliminate, although government regulation would be beneficial for controlling food additives and labelling contents of processed foods. For the Iatrogenic category, government regulation is necessary for ensuring treatment safety. There is room for individual motivation in eliminating excessive or unnecessary use of painkillers, such as NSAIDs or opioids, and unnecessary/elective surgeries.

Members of the Biotoxin/Biomaterial category (especially the Biotoxin component) are more difficult for individuals to eliminate. As we are seeing with COVID-19, virus exposure is difficult to control (as is bacterial exposure). There are many mycotoxins listed in Table 3-1. Those found in food may result from improper storage and insufficient processing to eliminate mycotoxins. Those in indoor environments may result from insufficient moisture/humidity control. Some of these problems can be addressed by stricter government regulations.

The Occupational/Environmental category could benefit substantially from more rigorous government regulation. Most of the exposures are beyond the control of the individual; in fact, the individual most probably doesn't know he/she is being exposed to these substances.

For example, the Occupational Safety and Health Administration (OSHA) has responsibility for regulating most workplace toxic exposures. Out of the more than 85,000 chemicals registered with the EPA, OSHA only issues Federally-enforceable Permissible Exposure Limits (PELs) for about 500 of these chemicals. In 2018, the first author published a study of the adequacy of OSHA's PELs [20], using a sampling technique. Of those substances that were sampled, their PELs were one to four orders of magnitude higher than exposures shown in the biomedical literature to cause damage.

As another example, the radiation exposure limits for wireless radiation (cell phone/cell towers/WiFi, etc.) approved by the FCC are from three to six orders of magnitude higher than exposures shown in the biomedical literature to cause damage, the discrepancy varying with the level of damage [21].

But, even in this category, individual choice and motivation play a role. People who want to strengthen their immune systems can choose (especially in the home environment, and partly in the work environment) to reduce exposure to wireless radiation, water with sodium fluoride, strong pesticides, strong disinfectants, etc.

The PsychoSocial/SocioEconomic category could benefit from some government interventions that reduce stressful situations for the individual (e.g., providing economic/health/occupational security, providing more protections for the most vulnerable (very young, elderly, disabled), etc.). Some of the types of adverse events and stresses are beyond the control of government or the individual, but here again, individuals can take steps to improve their responses to many of these types of stress.

Most of the studies, especially the laboratory studies, that gathered the data reported in Table 3-1 (and the more extensive [Tables](#) shown in [Appendix 4](#)) focused on the effects of one stressor/toxic stimulus in isolation. In real-life, people are exposed to myriad toxic stimuli, both in parallel and over different time periods. Typically, when toxic stimuli are combined, less of each constituent of the combination is required to cause damage compared to the amount determined from single stressor experiments [22]. Thus, real-life weakening of the immune system from myriad exposures to the toxic stimuli in Table 3-1 (and the [Tables](#) shown in [Appendix 4](#)) is far greater than that reported in the single toxic stimulus studies.

To summarize, repurposed (mainly) antiviral treatments can only be expected to have very limited results in controlling SARS-CoV-2 viral load of the most severely impacted, based on trials conducted so far. Further, based on the findings of [Appendix 3](#), it is difficult to see how safe COVID-19 vaccines can be developed and fully tested on time scales of one or two years, as proposed presently.

Finally, the only real protection against a future COVID-19 pandemic or any other viral pandemic is the one that was demonstrated to work in the SARS, MERS, COVID-19 and annual influenza pandemics: a healthy immune system capable of neutralizing incoming viruses as nature intended. We need an Operation Warp Speed (the Federal Administration Program currently targeted to produce a vaccine in a record short time period in the USA) to identify and eliminate those factors that weaken the immune system as thoroughly, comprehensively, and rapidly as possible!

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Appendix 1 – ROLE OF VIRUSES IN ECOSYSTEM

The role of viruses in pandemics cannot be understood without enumeration of their larger role in the ecosystem. The guiding principle of the biosphere is optimization of ecosystem sustainability. The operational principle by which this goal is achieved is “survival of the fittest”. This can be seen most clearly when examining all creatures on Earth (with the exception of humans), whose lifestyles are textbook examples of ecosystem sustainability (not to be equated with species sustainability; species come and go, but the ecosystem endures).

The operational principle is enforced by a process familiar to security personnel as a Red Team/Blue Team approach, involving constant probing of an organization’s defenses to identify their weakness, and improving the defenses in the process. These continual challenges of the biosphere to life on Earth are manifested at roughly three levels: macro, species, and micro. At the macro level (wind, rain, sun, heat, cold, humidity, etc.), there are continual challenges to living creatures (and plants, etc.) that require continual adaptation (at typically hormetic levels, but sometimes large challenges). The weakest creatures will succumb under the large-scale challenges.

At the species level, there are continual attacks by predators, which require that the prey remain in peak condition if they are to have any chance of survival. There is an old saying that the day the slowest Gazelle cannot outrun the fastest Lion will be the Gazelle’s last day on Earth!

At the micro level, myriad micro-organisms including viruses, bacteria, fungi, parasites, etc., can offer challenges. Of interest to this monograph is the role of viruses. The box below offers a summary perspective on the beneficial and pathogenic effects of viruses.

BENEFICIAL AND PATHOGENIC EFFECTS OF VIRUSES [23]

Viruses are parasites of host organisms. They may be beneficial or pathogenic to their hosts.

Beneficial Effects

- Infection with one virus may protect the host from a superinfection with another pathogen.
- Some viruses also have beneficial effects with respect to non-infectious diseases.
- Virus infection sometimes confers benefits including the regulation of microbiota in the gut; in particular, bacteriophages are thought to modulate the gut microbiota by infecting specific bacterial populations.
- Some endogenous retroviruses have been shown to play beneficial roles in their hosts, including host evolution.

Pathogenic Effects

“a virus is generally considered to be a causative agent like a poison that causes infectious diseases. These tiny, living entities have considerable import, because they can cause substantial damage to humans and non-human animals and other living organisms”.

Diversity of Viruses

- Currently, there are approximately 263 viruses from 25 viral families that are known to be able to infect humans.
- Most emerging infectious diseases are zoonotic (an infectious disease caused by a pathogen that has jumped from an animal to a human), mainly from wild animals such as primates, rodents, and bats.
- The PREDICT program has found over 1100 viruses in animals and humans.
- The Global Virome Project participants estimate that ~1.67 million yet-to-be-discovered viral species from key zoonotic viral families exist in mammal and avian hosts, and expect that 631 000–827 000 of these unknown viruses have zoonotic potential.

A subset of the virome, those zoonotic viruses that appear to be pathogenic in humans, challenge the immune system continually. This process appears to be a dual-edged sword. Immune systems that are strong are strengthened further by the continual challenges, offering additional protection against other viral challenges. Immune systems that are weak are unable to prevent the occurrence of life-threatening symptoms as a result. This is how nature implements ‘survival of the fittest’ at the microbial level.

Appendix 2 – VIRAL PANDEMICS AND STATISTICS

A2-A. Viral Pandemics

[Appendix 1](#) showed some of the roles played by viruses in the biosphere, and their centrality to life itself. The present appendix examines how this key component of the life process has morphed into a dangerous entity in the public consciousness.

Sometimes analogies can be highly instructive. We start this appendix with two analogies that illustrate the contributions of viruses to pandemics. The following boxes contain these analogies.

FIRST ANALOGY WITH VIRAL PANDEMIC

There is a large house in the desert; the roof has been completely neglected for thirty years. Ten large holes have opened up on the roof. Because there has been no rain, these holes have not been repaired, but have continued to grow. One day, a once-in-a-thousand-year rainstorm arrives. Water comes pouring through the holes in the roof. An emergency request for help is sent. First responders, neighbors, etc., come to help, and spend the day with buckets and pumps bailing out the water. They leave, the owners of the house have survived, but, because dry conditions re-emerge, they do absolutely nothing to repair the holes in the roof. Three years later, another once-in-a-thousand-year rainstorm arrives, and another panic response ensues.

Was the rain the cause of the chaos and damage; was it the holes in the roof; was it both?

Would we have worried about the rain if there were no holes in the roof?

Metaphorically, the rain is the coronavirus, and the holes in the roof are the toxic stimuli to which each person is exposed, and which contribute to weakening the immune system. Without the toxic stimuli and the associated weakened immune system, the coronavirus exposure/infection has little/no effect, except to (typically) generate antibodies that show up in the serum. That is seen in many healthy people, and the same was seen in the 2002-2003 SARS pandemic. It's hard to get exact numbers of people exposed but minimally affected, since not everyone is being tested, and those who are tested tend to be heavily weighted towards those exhibiting serious symptoms.

In this hypothetical case, is the rain the culprit? In the case of no holes in the roof, the rain had no effect. It only had an effect when combined with the holes in the roof. If a cause must be assigned, why shouldn't it be assigned to the holes in the roof, rather than the rain?

SECOND ANALOGY WITH VIRAL PANDEMIC

Assume there is a person standing in a room, with nothing else in the room but four metallic walls, a metallic ceiling, and a metallic floor. This person lights a match, and throws it on the floor. What will happen? Answer: nothing. The match burns itself out.

Now assume there's a flammable handkerchief on the floor. This person throws the lighted match on the handkerchief. What will happen? Answer: the handkerchief will burn for about a minute, and burn itself out. Still no problem.

Now assume there are a hundred pounds of ammonium nitrate (an explosive also used in agriculture) on the floor, as well as ten other flammable/explosive compounds. The person throws the lighted match on the floor. What will happen? Answer: the person will be transported to the next world!!!

Metaphorically, the match is the coronavirus, and the explosive/flammable components are the toxic stimuli to which the person is exposed, and which contribute to weakening the immune system. Without the toxic stimuli and the associated weakened immune system, the coronavirus exposure has little/no effect, except to (typically) generate antibodies that show up in the serum. That is seen in many healthy people, and the same was seen in the 2002-2003 SARS pandemic. It's hard to get exact numbers of people exposed but minimally affected, since not everyone is being tested, and those who are tested tend to be heavily weighted towards those exhibiting serious symptoms.

In this hypothetical case, is the match the culprit? In the completely bare room, the match had no effect. It only had an effect when combined with the explosive/flammable material. If a cause must be assigned, why shouldn't it be assigned to the ammonium nitrate, or some of the other explosive/flammable materials?

Both of the above analogies reflect the fact that we may be looking at the trees, and missing the forest, with respect to COVID-19. Let's focus on the quarantine (lockdown). It has been implemented widely across the globe. Those affected most severely by SARS-CoV-2 typically develop pneumonia, and die from pneumonia (or other severe respiratory disease). That's the official version, but it's far more nuanced and complicated. Some background, first.

The first author has developed a general protocol for preventing and reversing chronic diseases, and has developed protocols specifically for three chronic diseases (CKD (Chronic kidney disease), AD (Alzheimer's disease), PN (Peripheral neuropathy)/PAD (Peripheral arterial disease)) [16]. The key component of the protocol is identifying the foundational contributing factors to the diseases (i.e., the causes), and eliminating those foundational causes. The qualifier 'foundational' is used, since the causes identified are not other diseases (which some/much of the medical community uses in part when talking about causes), but rather tangible items that are (in theory) under individual or government regulatory control (e.g., smoking, excess alcohol, brominated flame retardants, heavy metals, pesticides, wireless radiation, etc.).

For the three chronic diseases examined, anywhere from 500-1,000 foundational causes each have been identified from the premier biomedical literature, and this number was viewed as a gross under-estimation of the actual number of foundational causes that exist in reality. Many of these foundational causes (such as those listed above) are pervasive, meaning that they impact multiple diseases [24]. One would expect that pneumonia (the central fatal consequence of the COVID-19 (and SARS-CoV) coronavirus infection) would also have hundreds of foundational causes as well. This is a key point.

The first author also studied the SARS coronavirus pandemic of 2002-2003, and published two papers on the topic [12-13]. The key takeaway from those studies was that there were roughly three types of consequences for the people who were exposed to/infected by the SARS coronavirus (SARS-CoV). One group exhibited no symptoms, and the only measures of exposure/infection were SARS coronavirus antibodies in their blood (where the blood was tested for non-SARS-related reasons). The second group exhibited symptoms characteristic of respiratory infections, and recovered after some level of discomfort. There were about 8,000 people globally who exhibited these symptoms, and went for medical care. The third group mainly developed pneumonia, and those that eventually succumbed died from the pneumonia. There were about 800 people globally in this latter group. However, this latter group was not a random selection of the 8,000. Its members had high comorbidity, weakened immune systems, and tended to be heavily populated by the elderly.

Comorbidity in common usage is typically used to mean other diseases. As stated in the main text of this monograph, each of these diseases can be viewed as a proxy for the hundreds of foundational factors that contribute to its development. Thus, if the cause-related co-ordinate systems are switched from diseases to foundational contributing factors (where the foundational causes are the independent variables and the diseases are the dependent variables), the high comorbidity group that succumbed to SARS had high numbers of foundational contributing factors to disease. This is the key point.

The current COVID-19 pandemic has some commonalities with the SARS pandemic. Most of the deaths in both cases resulted from pneumonia. Most of the deaths are among the elderly, and appear to be most prevalent among those with high comorbidities and weakened immune systems. From the perspective of the foundational contributing factor-based co-ordinate system, most of the fatalities are among those exposed (over their lifetime, as well as currently) to large numbers of foundational contributing factors to disease. There may be some fatalities for people born with weakened immune systems.

In general, the public is being exposed to a mixture of toxic stimuli, and it is the ***effect of the mixture*** that is driving the myriad consequences [22]. Different people will be exposed to different mixtures, and, based on the composition of the mixtures and a person's genetic makeup and overall level of health, will respond differently. There can be substantial synergies among the mixture constituents, resulting in enhanced adverse effects from the combination [22, 25]. The key concept here is that the ***mixture is determining the outcome***, not necessarily any one of its constituents in isolation.

The response of the governments worldwide (including the USA) to COVID-19 has been to impose a quarantine on the public, to restrict exposure to **only one of the many constituents** of the toxic stimuli mixture, SARS-CoV-2. This is one of the few constituents of the mixture that cannot be related to a technology offshoot, or to a technology that has production and/or consumption stakeholder backing (e.g., pesticides, industrial chemicals, radiation sources, etc.).

Thus, the present quarantine eliminates only one of the many constituents of the mixture, and it is the component that does not have strong production and/or consumption stakeholder backing!

If blame for the pandemic can be assigned to the one constituent of the toxic mixture with no backing from the aforementioned powerful stakeholders, then these production and/or consumption stakeholders are protected from responsibility and ensuing legal consequences. Assigning blame for the pandemic to Mother Nature rather than those who bear the major responsibility ensures that these harmful practices and their associated pandemics (including the annual deaths of the most vulnerable demographic related to the so-called influenza pandemics) will continue unabated.

Why are not any of the other constituents of the mixture being placed under quarantine? Why are not smoking, or air pollution, or excess alcohol, or wireless radiation, or agrochemicals, or industrial chemicals, being placed under quarantine? Approximately 403,000 deaths globally (as of 8 June 2020) [<https://www.hopkinsmedicine.org/health/conditions-and-diseases/coronavirus/coronavirus-disease-2019-vs-the-flu>] have been ascribed to SARS-CoV-2, and the total deaths ascribed to the three coronavirus pandemics over the past two decades would raise the above estimate by an additional 1,700 deaths. The fatalities that can be related to some (perhaps most) other constituents of the toxic stimulus mixture of foundational causes are far greater globally, when all their adverse effects are integrated.

Placing responsibility for the pandemic (and especially the deaths associated with the pandemic) on non-anthropogenic causes is not limited to the SARS-CoV-2 virus. In both the SARS pandemic and COVID-19, another of the factors assigned responsibility for some of the deaths is immune dysfunction and the associated 'cytokine storm': "the severity of disease might be due to immune dysregulation, rather than to the level of viremia. This dysregulation would be characterized by an insufficient type I interferon response (too little and too late), paralleled by an aberrant pro-inflammatory chemokine secretion by alveolar macrophages, dendritic cells and pneumocytes" [26]. Stated another way: "one could describe the unsuccessful immune response to SARS as "stuck in innate immunity," whereas the progression to adaptive immunity, with antibody production, strongly correlated with favorable outcomes." [27]. In other words, in some cases, the severe problems experienced by the most vulnerable demographic stem from the immune system's inability to switch from innate defense to adaptive defense in a timely manner.

As the main body of the text has shown, there are many hundreds of foundational factors that contribute to the weakening of the immune system. The most vulnerable demographic tends to have many comorbidities, which translates to exposure to many of the foundational factors that contribute to a weakened immune system. Therefore, the weakened immune system becomes the dependent variable, and its inability to switch from innate mode to adaptive mode may not be due (in some/many/most cases) to some intrinsic defect, but rather to the adverse effects from exposures to the many foundational factors that contribute to its dysfunction. Again, the responsibility for immune system dysfunction reported in both the mainstream media and the biomedical literature is not assigned to production and/or consumption stakeholder interests behind the foundational contributing factors, but rather assigned to some defect in the immune system for which the production and/or consumption stakeholders bear no responsibility.

It is clear from the SARS results (and probably the present COVID-19 results) that exposure to the coronavirus (for the most part) results in no outward symptoms or mild symptoms, *in the absence of large numbers of other toxic stimuli*. Thus, a more protective quarantine, for the current pandemic and against future pandemics, would be to impose quarantines against the intrinsically toxic constituents of the mixture. Whether they would have the same very-short-term benefits as the present coronavirus quarantine/lockdown is questionable, but from the long-term perspective, the broader quarantine would be very protective against future viral attacks on the most vulnerable demographic, including the annual influenza infections.

To be fully protective in the present pandemic and against future pandemics, both tactical reactive responses to survive the immediate threat and strategic proactive responses to prevent the problem and damage from re-occurring are required. Toward that end, the first author published a document on identifying tactical and strategic treatments for COVID-19 [17]. That document serves as the basis for the analysis presented in the present monograph.

A2-B. Assignment of Deaths in Viral Pandemics

Much of the discussion concerning the COVID-19 pandemic in the media and elsewhere revolves around the number of deaths attributed to COVID-19. There are two main problems here: the validity of assigning deaths to the consequences of SARS-CoV-2 exposure, and the uniformity of the criteria for assigning deaths to COVID-19. The previous section presented the argument that the deaths are mainly a consequence of *exposure to a toxic mixture*, and any assignment of responsibility or blame should be to the toxic mixture rather than any one pre-selected constituent. The virus is the trigger, and if there are no bullets in the chamber, pulling the trigger has no effect!

The criteria for assigning deaths to COVID-19 are not uniform across countries and, in the USA, not uniform across states. In addition, the highest-level guidance in the USA for assigning COVID-19 deaths is somewhat 'soft'. For example, consider the guidance for assigning deaths to COVID-19 distributed to medical personnel by the National Center for Health Statistics [28]:

"If the death certificate reports terms such as "*probable* COVID-19" or "*likely* COVID-19," these terms would be assigned the new ICD code. It is *not likely* that NCHS will follow up on these cases ... COVID-19 should be reported on the death certificate for all decedents where the disease caused or *is assumed to have caused or contributed* to death."

This wording allows a substantial level of flexibility in assigning a death to COVID-19, or any of the other comorbidities with which the most vulnerable demographic is associated. This is an important factor, since there are myriad political and financial motivations associated with assigning deaths to COVID-19.

For example, as stated by Scott Jensen, a physician in Minnesota and member of the State Senate [<https://www.usatoday.com/story/news/factcheck/2020/04/24/fact-check-medicare-hospitals-paid-more-covid-19-patients-coronavirus/3000638001/>]:

“Because if it's a straightforward, garden-variety pneumonia that a person is admitted to the hospital for – if they're Medicare – typically, the diagnosis-related group lump sum payment would be \$5,000. But if it's COVID-19 pneumonia, then it's \$13,000, and if that COVID-19 pneumonia patient ends up on a ventilator, it goes up to \$39,000.”

So, while there is no uniformity in assigning deaths to SARS-CoV-2, even if there were, the basic concept and the basic data are completely flawed, as shown above. This ***assignment of deaths to one constituent of a multi-constituent mixture is purely arbitrary***, and a political act done for political (and financial) purposes.

Appendix 3 – PROSPECTS FOR COVID-19 VACCINES

A3-A. Overview

The main body of this document addressed the first type of strategic treatment: 1) identification and removal of factors contributing to weakening the immune system (see section A4-A for a table of these contributing factors), and 2) identification and addition of factors contributing to strengthening the immune system (see [section A4-C](#) for a bibliography of low-tech immune system strengthening factors). The present appendix addresses the second type of strategic treatment: development and implementation of a COVID-19 vaccine. The prospects for such a vaccine will be addressed from three criteria perspectives: development time, efficacy, and safety.

A recent study evaluated the ongoing approaches to COVID-19 vaccine development, and stated: “Normally, the period of development of a vaccine is 12-15 years” [29]. Against this backdrop, SARS-CoV-2 vaccines are targeted for accelerated development, safety testing, manufacturing, and distribution by an order of magnitude. Each of the accelerated steps listed in this reference has drastically reduced the time required from normal development.

A3-B. Past Coronavirus Vaccine Development History

There have been two prior coronavirus pandemics in the 21st century: SARS in 2002-2003, and MERS starting in 2012. Vaccine development for each started/accelerated during the height of each pandemic. What have been the results of these prior coronavirus vaccine development efforts?

According to a comprehensive 2019 article on MERS vaccine development [30], “To date, there is no specific treatment proven effective against this viral disease. In addition, no vaccine has been licensed to prevent MERS-CoV infection thus far ... In general, the potential vaccine candidates can be classified into six types: viral vector-based vaccine, DNA vaccine, subunit vaccine, nanoparticle-based vaccine, inactivated-whole virus vaccine and live-attenuated vaccine”

According to a comprehensive 2020 article on SARS and MERS vaccine development [31], “As of April 2020, no vaccine is commercially available for these coronavirus strains”. The rationale for lack of a vaccine is given by the following: “Reasons for the lack of commercial and effective vaccines for SARS and MERS are varied. In the case of MERS, it is likely that the vaccine development was delayed because of the scarcity of suitable and cost-effective small animal models during pre-clinical experimentation. In addition, it is probable that a vaccine has not been delivered because of the low interest in investing in a vaccine for a disease that has produced relatively low and geographically centralized cases (compared with other more global and persistent infectious diseases such as influenza, HIV and tuberculosis). This last factor might have also contributed to the lack of a vaccine for SARS, in the sense that it was considered pointless to continue investing in a vaccine for a disease whose cases ceased to be reported in 2004.”

While interest in a vaccine may have waned after the SARS pandemic seemed to have terminated, research on such a vaccine persisted. References in the above article showed SARS vaccine research continued for a decade or more after the pandemic had ended [32-33].

Based on the experiences with SARS and MERS, successful vaccine development was not achieved after about a decade of research, or even more. That does not bode well for COVID-19 coronavirus vaccine development/safety testing/distribution on the order of one-year timescales being projected.

A3-C. Problems for Successful Vaccine Development

A3-C1. Overview

The main problems facing successful coronavirus vaccine development can be summarized as time to development, efficacy of the vaccine and, most importantly, safety of the vaccine. A complementary perspective on some of the problems listed in [29] can be stated as follows:

“First, although the virus’s spike protein is a promising immunogen for protection, optimizing antigen design is critical to ensure optimal immune response. Debate continues over the best approach — for example, targeting the full-length protein or only the receptor-binding domain.

Second, preclinical experience with vaccine candidates for SARS and the Middle East respiratory syndrome (MERS) have raised concerns about exacerbating lung disease, either directly or as a result of **antibody-dependent enhancement**. Such an adverse effect may be associated with a type 2 helper T-cell (Th2) response. Hence, testing in a suitable animal model and rigorous safety monitoring in clinical trials will be critical” [34].

Numerous mid- and longer-term potential adverse effects from vaccines have been identified. These include: 1) Antibody-Dependent Enhancement (where enhanced virus entry and replication in a number of cell types is enabled by antibodies) [35-36]; 2) Vaccine-associated Virus Interference (where vaccinated individuals may be at increased risk for other respiratory viruses because they do not receive the non-specific immunity associated with natural infection) [37-38]; 3) Vaccine-Associated Imprinting Reduction (where vaccinations could also reduce the benefits of ‘imprinting’, a protection conferred upon children who experienced infection at an early age) [39-40]; 4) Non-Specific Vaccine Effects on Immune System (where previous infections can alter an individual's susceptibility to unrelated diseases) [41-42]; 5) Impact of Infection Route on Immune System (where immune protection can be influenced by the route of exposure/delivery) [43-44]; and 6) Impact of Combinations of Toxic Stimuli (where people are exposed over their lifetime to myriad toxic stimuli that may impact the influence of any vaccine) [25]. Each of these effects will be addressed in more detail.

A3-C2. Antibody-Dependent Enhancement

The following amplifies further the concern about vaccine-induced enhancement: “Examples of vaccine-induced enhancement of susceptibility to virus infection or of aberrant viral pathogenesis have been documented for infections by members of different virus families. Several mechanisms, many of which still are poorly understood, are at the basis of this phenomenon ... Certain experimental lentiviral vaccines even proved to be counterproductive: they rendered vaccinated subjects more susceptible to infection rather than protecting them. For vaccine-induced enhanced susceptibility to infection with certain viruses like feline coronavirus, Dengue virus, and feline immunodeficiency virus, it has been shown that antibody-dependent enhancement (ADE) plays an important role ... Consequently, vaccine-induced enhancement has been a major stumble block in the development of certain flavi-, corona-,

paramyxo-, and lentivirus vaccines. Also recent failures in the development of a vaccine against HIV may at least in part be attributed to induction of enhanced susceptibility to infection” [35].

For another perspective on the ADE mechanism:

“for a number of viral pathogens, under certain conditions, antibodies provide an attractive means of enhanced virus entry and replication in a number of cell types. Known as antibody-dependent enhancement (ADE) of infection, the phenomenon occurs when virus-antibody immunocomplexes interact with cells bearing complement or Fc receptors, promoting internalization of the virus and increasing infection. Frequently associated with exacerbation of viral disease, ADE of infection presents a major obstacle to the prevention of viral disease by vaccination and is thought to be partly responsible for the adverse effects of novel antiviral therapeutics such as intravenous immunoglobulins.” [36]. These effects are confirmed further in numerous studies [45-49]

A3-C3. Vaccine-Associated Virus Enhancement

In addition to ADE, the effect of vaccine-associated virus interference (vaccinated individuals may be at increased risk for other respiratory viruses because they do not receive the non-specific immunity associated with natural infection) [37] need to be addressed. Consider the following examples:

“We identified a statistically significant increased risk of noninfluenza respiratory virus infection among TIV {trivalent inactivated influenza vaccine} recipients, including significant increases in the risk of rhinovirus and coxsackie/echovirus infection ... Receipt of TIV could increase influenza immunity at the expense of reduced immunity to noninfluenza respiratory viruses” [38];

“prior receipt of 2008-09 TIV was associated with increased risk of medically attended pH1N1 illness during the spring-summer 2009, with estimated risk or odds ratios ranging from 1.4 to 2.5” [50];

“Among children there was an increase in the hazard of ARI {acute respiratory illness} caused by non-influenza respiratory pathogens post-influenza vaccination compared to unvaccinated children during the same period.” [51];

“when influenza type A hit early, RSV {respiratory syncytial virus} outbreaks tended to be delayed, coronavirus outbreaks tended to be intensified,” [52];

“Examining non-influenza viruses specifically, the odds of both coronavirus and human metapneumovirus in vaccinated individuals were significantly higher when compared to unvaccinated individuals (OR = 1.36 and 1.51, respectively) ... the laboratory data in our study showed increased odds of coronavirus and human metapneumovirus in individuals receiving influenza vaccination ... While influenza vaccination offers protection against influenza, natural influenza infection may reduce the risk of non-influenza respiratory viruses by providing temporary, non-specific immunity against these viruses ... On the other hand, recently published studies have described the phenomenon of vaccine-associated virus interference; that is, vaccinated individuals may be at increased risk for other respiratory viruses because they do not receive the non-specific immunity associated with natural infection” [37]; and

“Here we show that reported influenza vaccination coverage rates for 29 OECD countries are associated significantly with recently observed SARS-CoV-2 infection rates in these countries. This early result, which merits further investigation, suggests that during the current coronavirus outbreak an influenza vaccination background might be a relevant factor for SARS-CoV-2 infection” [https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3558270].

A3-C4. Vaccine-Associated Imprinting Reduction

Vaccination could also reduce the benefits of ‘imprinting’, a protection conferred upon children who experienced infection at an early age, as the following shows:

“Imprinting by the first childhood influenza infection is known to confer long-lasting immunity focused toward priming epitopes. Our findings suggest vaccine mismatch may negatively interact with imprinted immunity. The immunological mechanisms for imprint-regulated effect of vaccine (I-REV) warrant investigation.” [39]; and

“we suggest that the potential impact of distant influenza immune imprinting on current vaccination outcomes should be considered in the design of next generation or universal vaccine candidates” [40].

A3-C5. Non-Specific Vaccine Effects on Immune System

“vaccines against infectious diseases have nonspecific effects on the ability of the immune system to handle other pathogens. For instance, in randomized trials tuberculosis and measles vaccines are associated with a substantial reduction in overall child mortality, which cannot be explained by prevention of the target disease. New research suggests that the nonspecific effects of vaccines are related to cross-reactivity of the adaptive immune system with unrelated pathogens, and to training of the innate immune system through epigenetic reprogramming ... diphtheria-tetanus-pertussis (DTP) vaccine, although protective against the three target diseases, increases female mortality from other infectious diseases ... and it turned out that DTP vaccine administered after the measles vaccine was the explanation for the increased female mortality observed in the high-titer measles vaccine trials ... The effects of vaccines on the immune system may be modulated by other immune-modulating factors. Interactions are found between vaccines and high-dose vitamin A supplementation ... and two vaccines may have completely different effects when administered simultaneously ... We need to explore systematically what is likely to happen when our effective interventions are administered with other vaccines, drugs, or micronutrients and in different sequences.” [41]; and

“Epidemiological data suggest that previous infections can alter an individual's susceptibility to unrelated diseases ... Substantial research efforts have expanded the classical concept of immune memory to also include long-lasting changes in innate immunity and antigen-independent reactivation of adaptive immunity. Collectively, these processes provide possible explanations on how acute infections might induce long-term changes that also affect immunity to unrelated diseases ... This heightened state of alert enhances the ability of the immune system to combat even unrelated infections but may also increase susceptibility to autoimmunity. At the same time, infection-induced changes in the regulatory compartment may dampen subsequent immune responses and promote pathogen persistence.” [42].

A3-C6. Impact of Infection Route on Immune System

Vaccine-based infections have different routes of exposure from natural exposure, and this could lead to different impacts on the immune system. The typical vaccine is injected directly into the bloodstream, thereby bypassing much of the innate immune system, while the naturally acquired infection evolves through the time-consuming process of delay and resistance by the innate immune system. Studies have been performed examining the effects of different routes of exposure. For example:

“our study demonstrates that the identification of candidate LAVs {live attenuated viruses} and immune protection markers in an animal model can be strongly affected by the route of infection used” [43]; and

“vaccine formulation and route of delivery can influence outcomes as suggested by our studies ... Consideration of alternative methods rather than reliance on parenteral methods for vaccination can lead to vaccination strategies that produce improved efficacy and long-term memory response. Such improvements in protection came about by considering brucellosis as a mucosal disease, rather one that solely produces a systemic disease. Empowering mucosal approaches could harness additional lymphocytes to protect against infection, particularly since most infections occur following a mucosal exposure” [44].

A3-C7. Impact of Combinations of Toxic Stimuli

“In the combination case, typically less of each constituent of the combination is required to cause damage compared to the amount determined from single stressor experiments. Thus, exposure limits based on single toxic stimulus experiments are inadequate for setting limits for stressor combinations.” [22].

A3-C8. Long-Term Safety Requirements

While the efficacy issues for a COVID-19 vaccine have been enumerated extensively in recent reviews [29, 34], more emphasis needs to be placed on ensuring mid- and long-term safety are achieved. Vaccines do not appear to have the same safety requirements as many drugs. For example, consider the following excerpts from selected vaccine inserts relative to safety [https://www.vaccinesafety.edu/package_inserts.htm]:

-MMR Vaccine “M-M-R II has not been evaluated for carcinogenic or mutagenic potential, or potential to impair fertility ... Animal reproduction studies have not been conducted with M-M-R II.”;

-Influenza Vaccine “FLUARIX QUADRIVALENT has not been evaluated for carcinogenic or mutagenic potential or male infertility in animals.”;

-DTAP Vaccine “INFANRIX has not been evaluated for carcinogenic or mutagenic potential or for impairment of fertility.”; and

-HPV Vaccine “GARDASIL 9 has not been evaluated for the potential to cause carcinogenicity, genotoxicity or impairment of male fertility.”

Long-term safety studies of vaccines are rare (however, see bibliography at the end of this Appendix for some examples). The typical vaccine study is aimed at efficacy. Such studies tend to be a few months long, and the main evaluation criterion is titers of antibody in the serum.

Vaccines, especially childhood vaccines, are administered according to a schedule, which now comprises about seventy+ doses covering about sixteen vaccines. The schedule-based combination effects of these seventy+ vaccine doses have not been tested, and, therefore, adverse effects due to real-life vaccine synergies are unknown.

Much of the published data for vaccine adverse events (at least in the USA) originates from the VAERS database. VAERS is a passive monitoring system, and, like all similar systems, suffers from substantial under-reporting of adverse events [53]. A groundbreaking study [54], performed by Harvard Pilgrim Healthcare, Inc, reported that “fewer than 1% of vaccine adverse events are reported”. In other words, the actual numbers of adverse reactions to vaccines are one to two orders of magnitude higher than those reported in VAERS!

The methodology for obtaining this result was as follows: “Every patient receiving a vaccine was automatically identified, and for the next 30 days, their health care diagnostic codes, laboratory tests, and medication prescriptions are evaluated for values suggestive of an adverse vaccine event. When a possible adverse event was detected, it was recorded, and the appropriate clinician was to be notified electronically.”

Thus, these adverse events are single-visit short-term adverse events (within thirty days of the vaccination). They do not reflect the results of vaccination combinations administered over a longer period than thirty days, and they do not reflect results of vaccinations of any type in the mid-or long-term [54].

If fewer than 1% of vaccine adverse events are reported, how well does this sample reflect the total number of adverse events actually experienced? This is not a randomly-selected sample, as would be required for a statistically-valid result. Thus, even analyses of short-term adverse effects based on VAERS data are severely flawed. And, if fewer than 1% of these short-term adverse events are reported, what fraction of longer-term adverse events (where the connection between the adverse event and the vaccination becomes more tenuous as time proceeds) would be reported? One can only conclude that a negligible fraction of long-term adverse events is reported in a passive monitoring system like VAERS.

A3-C9. Time Required for Credible COVID-19 Vaccine Safety Studies

As the above results have shown, vaccines can have long-term impacts on the immune system (positive and negative), and short and long-term effects on other diseases. The effects of vaccines can vary according to route of infection, prior history of vaccinations, and, as stated by Benn et al above, administration “with other vaccines, drugs, or micronutrients and in different sequences.” [41]. To accelerate the time required to demonstrate long-term safety, laboratory experiments are usually done using animals with relatively short lifespans whose responses to myriad toxic stimuli are similar to that of human beings.

One major difference between these animal experiments and the human model is that the laboratory experiments are usually performed with the administration of a single toxic stimulant, or maybe two, while the human model lives in a sea of toxic stimuli.

There are many examples in the biomedical literature where combined exposures to toxic stimuli showed adverse effects whereas exposures to the same stimuli in isolation (at the same dosages) showed no adverse effects [25, 55]. Thus, unless these laboratory experiments are performed with a range of combinations of associated immunomodulators, they would not be credible for safety assessment purposes. Such experiments would require enormous amounts of financial and time resources.

The other alternative is to perform these safety studies with human beings. For long-term safety studies, decades could be required for credible results. Thus, there is a major disconnect between the time required for credible safety studies of a COVID-19 vaccine and the one-year or less vaccine commercialization being propounded by decision-makers in the media today.

A3-D. Vaccine Bibliography - Short and Long-Term Vaccine Impacts

The following is a short sampling of records showing potential adverse short and long-term vaccine effects.

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Appendix 4 – FACTORS THAT WEAKEN AND STRENGTHEN IMMUNE SYSTEM; BIBLIOGRAPHIES

A4-A. Contributing Factors to Weakened Immune System

This section presents the complete list of factors that contribute to weakening of the immune system based on our analysis of the retrieved data base. About 10,800 records were retrieved using the query shown in Chapter 2 (and other records identified in the course of the analysis), about 7,000 of these records were analyzed, and about 4,700 (of the 7,000) records identified factors that contributed to weakening of the immune system. The contributing factors from these ~4,700 records were aggregated, and slightly over 2,200 contributing factors were entered into the tables below. Not all redundancies were eliminated, but if even on the order of 30% redundancy exists, this means that about 1,500 contributing factors to weakening the immune system have been identified.

This is a very conservative estimate. The query in [Chapter 2](#) was written to retrieve those articles most relevant to immune-weakening factors, given the labor-intensive approach taken to identify these factors from the retrieved articles. A much more expansive query, albeit with less precision, would have retrieved tens of thousands of articles, and produced many more contributing factors.

But, the 1,500 constitute a large number, are far more than we have seen in any one article, and probably cover all the major contributing factors. Any measures that an individual or government regulator can take for protecting the health of the immune system will only be able to deal with a small fraction of the 1,500 already identified, at least initially.

Tables A4-1 to A4-5 contain the ~2,200 contributing factors, divided into five categories: Lifestyle, Iatrogenic, Biotoxin/Biomaterial, Occupational/Environmental, Psychosocial/Socioeconomic. This is a categorization we have been using for the past few years [16]. Many other categorizations are possible, and may offer additional insights.

TABLE A4-1. CONTRIBUTING FACTORS TO WEAKENED IMMUNE SYSTEM
(LIFESTYLE)

Advanced Glycation End Products
Age
Alcohol Abuse
Aniline-Adulterated Rapeseed Oil
Argemone Oil
Biomass Smoke Exposure
Caesarian Delivery
Cannabinoid
Cheese
Chronic Sleep Restriction
Cigarette Smoking
Cinnamaldehyde
Cocaine
Cow's Milk Insulin
Crack

Dietary Biotin Deficiency
Dietary Excess Lipids
Dietary Fatty Acid Intake
Dietary Iron Deficiency
Dietary Iron Excess
Dietary Low Lipids
Dietary Niacin Deficiency
Dietary Oxidized Lipids
Dietary Phosphorus Deficiency
Dietary Protein Restriction
Dietary Pyridoxine Deficiency
Dietary Thiamin Deficiency
Dietary Valine Deficiency
Dietary Zinc Deficiency
Diet-Induced Obesity

Drug Abuse
Early Antibiotic Use
Early Life Diet
Early Weaning Stress
E-Cigarette
Ecstasy
Ethanol Consumption
Ethanol Intoxication
Excess Dietary Cholesterol
Excessive Se
Extended Contact Lens Wearing
Fast-Food Burger
Fatty Acid Anilides
Fetal Alcohol Exposure
Fish Extracts
Fish Oil Supplementation
Flavored E-Cigarette Liquids
Folic Acid Deficiency
Formula Feeding
Genistein
Glue Solvent
Gluten
Heavy Competition
Heavy Training
High Fat Diet
High Glucose Exposure
High N – 6 Fatty Acid-Trans Fat
High-Cholesterol Diet
High-Fat-Diet
Hygiene Hypothesis
Ice Cream
Isobutyl Nitrite
Isoflavones
Linoleic Acid
Linolenic Acid
Low Dietary N – 3 Fatty Acid
Low Prenatal-Neonatal Animal Bacterial Exposures
Maize Prolamins
Malnutrition
Maternal Separation In Early Life
Maternal Smoking

Maternal Undernutrition
Medication Use
Methamphetamine
Methylenedioxymethamphetamine
Microbial Depletion In Early Environment
Minced Pork
Minced Turkey
Mobile Phone
Morphine Dependence
N-Propyl Gallate
Obese Pregnancy
Opioid
Paracetamol
Peanuts
Peppermint Oil
Phencyclidine
Phloretin-Contained Fruits
Prenatal Nutrient Energy Overload
Prenatal Nutrient-Insufficiency
Protein Malnutrition
Protein-Deficient Diet
Recreational Drugs
Rectal Insemination
Red Meat Consumption
Reduced Neonatal Microbial Environment
Sedentary
Selenium Deficiency
Snuff
Sodium Nitrite
Synthetic Food Additive Antioxidants
Tetrahydrocannabinol
Tobacco Smoking
Traffic Pollution
Vitamin A Deficiency
Vitamin B-12 Deficiency
Vitamin B-6 Deficiency
Vitamin C Deficiency
Vitamin D Deficiency
Western-Style Diets
Wheat Gluten
Yoghurt
Zinc Deficiency

TABLE A4-2. CONTRIBUTING FACTORS TO WEAKENED IMMUNE SYSTEM

(IATROGENIC)

([2-Fluoro-2',5'-Dimethyl-4'-[6-(3-Methyl-2-Butenyloxy) Pyridin-3-yl] Biphenyl-4-yl]-(3-Methyl-2-Butenyl) Amine)	Abeta Immunization
(S)-1-(3-Hydroxy-2-Phosphonylmethoxy Propyl) Cytosine	Abetimus
145-2C11	Acetaminophen
17alpha-Ethinyl Estradiol	Acetylsalicylate
17beta-Estradiol	Acetylsalicylic-Acid
18beta-Glycyrrhetic Acid	Acteoside
1-Chloro-2,4-Dinitrobenzene	Actinomycin D
2,2'-Dichlorodiethyl Sulfide	Acyclic Retinoid
2,4-Dichlorophenoxybutyric Acid	Acyclovir
2-[Bis(2-Chloroethyl)Amino]Tetrahydro-2H-1,3,2-Oxazophosphorine 2-Oxide	Adalimumab
2'3'-Dideoxyinosine	Adenosine 5'-Monophosphate (AMP) Quantum Dots (QDs) (AMP-QD)
2-Amino-2-(2-[4-Octylphenyl]Ethyl)-1,3-Propanediol Hydrochloride	Adjuvanted Vaccines
2-Aryl Carbapenem	Adjuvants
2'-Deoxycoformycin	Adriamycin
3,3'-Diindolylmethane	ADTP Vaccine
3'-Azido-2',3'-Dideoxythymidine	Advagraf
3-Methyl-2-Quinoxalin Benzenevinylketo-1, 4-Dioxide	Afelimomab
4aza1378	Aldesleukin
5 Alpha-Dihydrotestosterone	Aldosterone
5-Azacytidine	Alefacept
5'-Deoxy-5-Fluorouridine	Alemtuzumab
5'-Dfur	Alendronate
5'-Dfurd	Alfathesin
5-Fluorouracil	Alkylating Chemotherapy
6-Fluoro-8-Nitro-4-Oxo-1,4-Dihydroquinoline-3-Carboxylate	Allogeneic Bone Marrow Transplantation
9-(N-Methyl-L-Isoleucine)-Cyclosporin A	Allogeneic Hematopoietic Stem Cell Transplant
Abacavir	Allopurinol
Abatacept	Alloxan
Abciximab	Alovudine
	Alpha-Ethinylestradiol
	Alpha-Methyldopa
	Alpha-Momorcharin
	Altretamine
	Ambisome
	Amiodarone

Amlodipine
Amoxicillin
Amphenicols
Amphotericin
Amprenavir
Amsacrine
Anabolic Androgenic Steroid
Anakinra
Anesthesia
Antibiotics
Anticalcineurin
Anti-CD20
Anti-CD3 Monoclonal Antibody
Anticonvulsants
Anti-CTLA-4 Antibody
Anti-D Immunoglobulin
Anti-D(Beta)H-Saporin
Antilymphocyte Globulin
Anti-Programmed Death 1
Antiretroviral Agents
Antithymocyte Globulin
Anti-Thymocyte Globulin Treatment
Antituberculosis Drug
Antiviral Treatment
Antiviral Vaccines
Apicidin
Apremilast
Arctigenin
Aripiprazole
Artemisinin
Aspirin
Atgam
ATG-Fresenius S
Atropine
AZA
Azacitidine
Azathioprine
Azidothymidine
Azithromycin
Bacille Calmette-Guerin Vaccine
Bariatric Surgery

Basiliximab
Begelomab
Belatacept
Belimumab
Belinostat
Bendamustine
Benzocaine
Berberine
Beta-Diketone Antibiotics
Beta-Lactam Antibiotics
Betalactams
Betamethasone
Bevacizumab
Bexarotene
Bezafibrate
Biopin
Bisphosphonates
Bleomycin
Blinatumomab
Blood Transfusion
Bone Marrow Transplantation
Bortezomib
Bosutinib
BR96 sFv-PE40
Breast Implant
Brentuximab Vedotin
Briakinumab
Brodalumab
Bucillamine
Budesonide
Buprenorphine
Busulfan
Butalbital
Cabazitaxel
Calcineurin Inhibitors
Calcium Folate
Calcium Hydroxylapatite
Canakinumab
Capecitabine
Carbamazepine
Carbendazim
Carboplatin

Carboxyphosphamide
Cardiac Surgery
Cardiopulmonary Bypass
Carfilzomib
Carmofur
Carmustine
Castanospermine
Catecholamine
Cecal Ligation And Puncture
Cefotetan
Ceftazidime
Ceftriaxone
Cefuroxime
Celecoxib
Cephalosporin
Certolizumab Pegol
Cervus Korean TEMMINCK Var. Mantchuricus Swinhoe
Chemoradiation Therapy
Chemotherapeutics
Chemotherapy
Chinese Medicine Injection
Chlorambucil
Chloramphenicol
Chlordecone
Chlorhexidine
Chloroquine
Chlorpromazine
Cholinotropic Preparations
Cidofovir
Cimetidine
Ciprofloxacin
Cisplatin
Cis-Platinum
Citalopram
Cladribine
Clavulanic Acid
Clemastine
Clofarabine
Clometacin
Clonazepam
Clozapine

Colchicine
Combination Antiretroviral Therapy
Complete Freund's Adjuvant
Congenital Heart Disease Surgery
Cord Blood Transplantation
Coriandrum Sativum
Corticoid
Corticosteroids
Corticosterone
Corticotropin
Cortisol Implants
Cortisone Acetate
Cotrimoxazole
Cranial Radiotherapy
Cremophor-EL
CsA
CT20126
Cupravit
Cuprizone
Cyclophosphamide
Cyclophosphamide
Cyclosporin
Cyclosporine
Cyclosporine G
Cytarabine
Cytokine Gene Therapy
Cytostatic Drugs
Cytotoxic Drug Therapy
Cytosan
Dacarbazine
Daclizumab
Dactinomycin
Daptomycin
Dasatinib
Daunorubicin
Daunoxome
Death-Ligand 1 Antibodies
Decitabine
Deflazacort
Delta(9)-Tetrahydrocannabinol
Deoxyspergualin

Derivative Of Gamma-Aminobutyric Acid
Dexamethasone
Dexrazoxane
DHPG
Diazepam
Diclofenac
Didanosine
Diethylstilbestrol
Digoxin
Dihydralazine
Dilantin
Dimethyl Fumarate
Dinutuximab
Diphenylhydantoin
Diphtheria-Tetanus-Poliomyelitis Vaccine
Docetaxel
Dolutegravir
Dow2
Doxifluridine
Doxil
Doxorubicin
D-Penicillamine
Drospirenone
Drug G1
Eculizumab
Efalizumab
Efavirenz
Enemas
Enfuvirtide
Epirubicin
Equine Antithymocyte Globulin
Eribulin
Erythromycin
Estradiol
Estramustine
Etanercept
ETC-216
Ethinylestradiol
Ethyl 4-Isothiocyanatobutanoate
Etoposide

Everolimus
Fenofibrate
Fenofibric Acid
Feraheme
Fibrates
Fingolimod
FK 506
FK-50
Flavivirus Vaccination
Florfenicol
Floxuridine
Fluazuron
Flucloxacillin
Fluconazole
Flucytosine
Fludarabine
Fludrocortisone
Fluocinolone Acetonide
Fluoroquinolones
Fluorouracil
Fluoxetine
Foscarnet
FTY720
Fusidic Acid
Gadobutrol
Gallium Nitrate
Ganciclovir
Gastrectomy
Gemcitabine
Gemfibrozil
Gemtuzumab Ozogamicin
Gentamycin
Glatiramer
Glimepiride
Glivec
Glucocorticoids
GM-CSF Vaccine
Golimumab
Gosereline Acetate
Granulocyte Colony Stimulating Factor
Gusperimus

HAART
Haloperidol
Halothane
hCG-Related Oligopeptides
HDAC Inhibitors
Hematopoietic Stem Cell Transplantation
Hemodialysis
Heparin
Hepatectomy
Hepatitis B Immunoglobulin
Hepatitis B Vaccine
Hgd40
Highly Active Antiretroviral Therapy
Histone Deacetylase Inhibitors
Human Immunodeficiency Virus Protease Inhibitors
Human Papilloma Virus Vaccine
Hydantoin
Hydralazine
Hydrochlorothiazide
Hydrocortisone
Hydroxychloroquine
Hydroxyethyl Starch
Hydroxylamine
Hydroxyurea
Hypericin
Ibritumomab Tiuxetan
Ibrutinib
Ibuprofen
Icotinib
ID35
Idarubicin
Idelalisib
IFN-Alpha
IFN-Beta
Ifosfamide
Igg Immune Complex
IK Blockers
IL-15 Superagonist
Imatinib

Imiquimod
Immune Checkpoint Inhibitors
Immunoglobulin G Immune-Complex
Immunoglobulins
Immunomodulatory Monoclonal Antibodies
Immunostimulatory Oligodeoxynucleotide
Immunosuppressants
Immunosuppressive Acid Protein
Immunosuppressive Agents
Immunosuppressive Drugs
Immunosuppressive Induction Therapy
Indinavir
Indomethacin
Infliximab
Influenza Vaccination
Influenza Vaccine
Inteferon Alpha/Beta
Interferon Alfacon-1
Interferon Alfa-N3
Interferon Alpha
Interferon Alpha Therapy
Interferon Beta-1a
Interferon Type 1
Interferon-Alpha
Interleukin 2 Receptor Antibody
Intravenous Gammaglobulin
Intravenous Immunoglobulin
Intravenous Immunoglobulin G
Ipilimumab
Iproniazid
Iproniazide
Irinotecan
Isoflurane
Isoniazid
Isoproterenol
Ivermectin
Ixabepilone
Ixazomib

Jak-Inhibitors
Ketorolac
Keyhole Limpet Haemocyanin
L. Acidophilus
Lamivudine
Lamotrigine
L-Arginine
L-Canaline
L-Canavanine
Leflunomide
Left Ventricular Assist Device
Lenalidomide
Leuprolide Acetate
Levamisole
Linezolid
Lipidated Tn-ApoA-I
Liposomal Drugs
Liquamycin 200
Lomustine
Lopinavir
Lorabid
Loracarbef
Lorazepam
L-Tryptophan
Lymphocyte Immune Globulin
M344
mAbs
Major Surgery
Mammary Silicone Implants
M-Carboxy-Cinnamicacidbis-Hydroxamide
Measles, Mumps, And Rubella Vaccine
Mechlorethamine
Medical Devices In Contact With The Blood Stream
Medroxyprogesterone
Medroxyprogesterone Acetate
Mefenamic Acid
Meglumine Antimoniate
Melphalan
Mepolizumab

Mercaptopurine
Meropenem
Methadone
Methimazole
Methotrexate
Methylprednisolone
Midazolam
Minocycline
Mirtazapine
Misoprostol
Mitoxantron
Mitoxantrone
Mizoribine
Mometasone
Mometasone Furoate
Monoclonal Anti-16/6 Id Antibody
Monoclonal Antibodies
Monoclonal Antilymphocyte Antibodies
Monomethyl Fumarate
Morphine
Morphine Sulfate
Moxifloxacin
Murine-Derived Monoclonal CD3 Antibody
Muromonab
Mycophenolate Mofetil
Mycophenolate Sodium
Mycophenolic Acid
Mycophenolic Acid
N4-Trimethoxybenzoyl-5'-Deoxy-5-Fluorocytidine
N-Acylhydrazone
Nanomedicinal Products
Nanoparticle-Formulated Drugs
Naproxen
Natalizumab
N-Desmethylozapine
Nelarabine
Neomycin
Nevirapine

N-Hydroxy-7-(-4-Dimethylaminobenzol)Aminoheptanamide
Nifedipine
Nilotinib
Nitrofurantoin
Nitrogen Mustard
Nivolumab
Nomifensine
Non-Steroidal Anti-Inflammatory Drugs
Norfloxacin
Norfloxacin Nicotinate
Novobiocin
Nsaids
Nucleic Acid-Based Therapeutics (Nats) By A Nanocarrier
Obinutuzumab
Ocrelizumab
Ofatumumab
Ofloxacin Eyedrops
Olaparib
Omega Interferon
Open-Heart Surgery
Operation
Oral Antibiotic Treatment
Oryza Sativa
Oseltamivir
Oxaliplatin
Oxcarbazepine
Oxytetracycline
Ozanimod
Paclitaxel
Palbociclib
Panitumumab
Panobinostat
Paramethasone
Paroxetine
Pazopanib
Peficitinib
Pefloxacin
Pegaspargase

Peginterferon Alfa-2a
Peginterferon Alfa-2b
Peginterferon Beta-1a
Pembrolizumab
Pemetrexed
Penicillamine
Penicillin
Penicillin G
Pentamidine
Pentamidine Isethionate
Pentosan
Pentostatin
Pentylene-tetrazole
Peplomycin
Peritoneal Dialysis
Permethrin
Phenprocoumon
Phenylalanine
Phenytoin
Phospholipid-Based Phase Separation Gel
Photodynamic Therapy
Photoimmunotherapy
Pimecrolimus
Piperacillin
Piperine
Piracetam
Pirarubicin
Pirfenidone
Plasma-Derived Human Serum Albumin P
Pneumococcal 13-Valent/23-Valent Polysaccharide Vaccine
Pneumococcal Vaccine
Poliomyelitis Vaccine
Polivalent Immunoglobulins
Polyclonal Antilymphocyte Antibodies
Polyclonal Antithymocyte Antibody
Poly-lactic-Co-Glycolic Acid Nanoparticle
Polymerized Porcine Hemoglobin

Pomalidomide
Ponatinib
Poppers
Post-Bone Marrow Transplant
Pralatrexate
Prednicarbate
Prednisolone
Prednisone
Prednylidene
Preoperative Chemoradiotherapy
Previcur
Procainamide
Procarbazine
Progesterone
Prograf
Propranolol
Propylthiouracil
Propyphenazone
Protamine
Psoralen
PUVA Treatment
PYCNOGENOL
Pyrazinamide
Pyrimethamine
Qingkailing
Quinine
Raav Gene Medicine
Rabbit Antithymocyte Globulin
Radio-Immunotherapy
Radioiodine Therapy
Radiotherapy
Raltitrexed
Rapamycin
Ravulizumab
Recombinant 19-kDa Antigen
Recombinant Human Granulocyte-Macrophage Colony-Stimulating Factor
Renal Allografts
Rhgm-Csf
Rhododenol
Rhuifn-Alpha

Ribavirin
Rifabutin
Rilonacept
Rimantadine
Rimexolone
Risankizumab
Risperidone
Ritonavir
Rituximab
RN6G
Ro 09-1390
Romidepsin
Rosuvastatin
Rozanolixizumab
Rubella Vaccine
Ruxolitinib
S-2678
Sanguinarine
Sarilumab
Secukinumab
Seocalcitol
Serotonin Reuptake Inhibitors
Sevoflurane
Silicon Breast Implant
Siltuximab
Siponimod
Sirolimus
Sirukumab
SK&F 95654
Sorafenib
Splenectomy
Statins
Stavudine
Stem Cell Transplantation
Stepronin
Steroids
Streptozocin
Su5416
Suberoylanilide Hydroxamic Acid
Sulfamethazole
Sulfamethoxazole
Sulfapyridine

Sulfasalazine
Sulfisoxazole
Sulfur Mustard
Sulindac
Sulphadiazine
Sulphamethoxazole
Sulphonylurea
Sunitinib
Supplemental Oxygen
Surgery
Surgical Damage
Surgical Stress
Surgical Trauma
Synthetic Human Chorionic Gonadotropin-Related Oligopeptides
Tabalumab
Tacrolimus
Tamoxifen
Tazobactam
Tedizolid Phosphate
Tegafur
Teicoplanin
Temozolomide
Temsirolimus
Teniposide
Tenofovir
Tepoxalin
Teriflunomide
Tetracyclines
Tetrandrine
TGN1412
Thalidomide
Thiamphenicol
Thiazolidinedione
Thiopental
Thiopronine
Thiopurine Agents
Thiotepa
Thoracic Transplantation
Thymectomy
Thymoglobulin

Ticlopidine
Tienilic Acid
Tioguanine
Tirofiban
Tixocortol
Tobramycin
Tocilizumab
Tofacitinib
Topotecan
Tositumomab
Total-Body Gamma Radiation
Total-Body Irradiation
Trabectedin
Trastuzumab Emtansine
Tremelimumab
Trenbolone Acetate
Treponema Spp.
Tretinoin
Triamcinolone
Triamterene
Triazene Compounds
Trichosanthin
Trichostatin A
Trifluridine
Trilostane
Trimethoprim
Triptolide
Trofosfamide
Troglitazone
Trovafloxacin
Tumor Necrosis Factor Alpha Antagonists
Tyrosine Kinase Inhibitors
Ulobetasol
Umbilical Cord Blood Transplantation
Umirolimus
Ustekinumab
Vaccinations
Vaccines
Valproic Acid
Vancomycin

Vedolizumab
Venlafaxine
Venocuran
Verapamil
Verapamil Hydrochloride
Vesnarinone
Vigabatrin
Vilanterol
Vinblastine
Vincristine

Vindesine
Vinorelbine
Voclosporin
Vorinostat
Warfarin
Wortmannin
YF Vaccine
Zalcitabine
Zanamivir
Zidovudine

TABLE A4-3. CONTRIBUTING FACTORS TO WEAKENED IMMUNE SYSTEM
(BIOTOXINS/BIOMATERIALS)

09 LPS
192 IgG-Saporin
ATCC 25285
A. Actinomycetemcomitans
Aahl
AahlI
Abscisic Acid
Aerosolized Porcine Brain
Aflatoxin
Aflatoxin B
Aflatoxin B1
Aflatoxin M1
Aflatoxins
Airborne Fungus
Alcohols
Amylosin
Anatoxin-A
Androctonus Australis Hector Scorpion Venom
Anthrax Lethal Toxin
Anti-Dopamine Beta-Hydroxylase Immunotoxin
Antigenic Peptide P815E
Antx-A
Asobara Japonica Venom

Aspergillus Fumigatus Spores
Aspergillus Versicolor
Ataxin-1 Oligomers
Atranone A
Atranone C
B. Forsythus
Bacillus Calmette-Guerin
Bacillus Thuringiensis Israelensis
Bacterial
Bacterial Infections During Pregnancy
Bacteroides Fragilis
Beauvericin
Berthellina Citrina
Beta-(1,3)-Glucan
Bilirubin
Bordetella Pertussis
Borrelia Burgdorferi
Bovine Viral Diarrhea Virus
Brevetoxin
Brown Recluse Spider Venom
Brucella Melitensis
Bursal Disease Virus
Butylated Hydroxytoluene
C. Albicans
C. Perfringens

C. Rectus
Candida Albicans Water Soluble Fraction
Capnocytophaga
Cardiac Glycoside
Carrageenan
Catalase
Chitosan
Chlamydia Pneumoniae
Cholera Toxin
Chronic Viral Infection
Chrysaora Quinquecirrha Venom
Cis-Urocanic Acid
Citrinin
Clade B Human Immunodeficiency Virus
Clostridium Perfringens
CMV
Cobra Venom Factor
Coinfection With An Intestinal Helminth
Collagen
Concanavalin A
Contact Allergens
Cotesia Chilonis Venom
Coxsackievirus B3
Cryopreserved Mesenchymal Stromal Cells
Cyanobacteria
Cyanobacterial Metabolites
Cyanotoxin
Cyclopiazonic Acid
Cylindrospermopsin
Cytomegalovirus
Daphnane Diterpene Esters
Demodex Mites
Dengue Infection
Deoxynivalenol
Dermatophagoides Pteronyssinus Group 5
D-Galactosamine
D-Galactose
Dinoflagellate Genus Alexandrium
Domoic Acid
Dust

Dust Mite
E. Coli Endotoxin
E. Nodatum
EBV
Echinacea
Echinococcal
Endotoxin
Enniatin B
Epstein-Barr Virus
Escherichia Coli 0:14 Lipopolysaccharide
Escherichia Coli Lipopolysaccharide
Estrogen
Estrogenic Xenobiotics
Excess Growth Hormone
Extractable Organic Matter
Fasciola Hepatica
Flour Dust
Francisella Tularensis
Friend Leukemia Virus
FtoxG50
Fumonisin B1
Fungal Bioaerosols
Fusarenon-X
Fusaric Acid
Fusariotoxins
Fusarium T-2 Toxin
Fusobacterium Nucleatum
Galactosamine
Gibberellic Acid
Ginkgo Leaf Extracts
Gladiin
Glutotoxin
Glucose-6-Phosphate Isomerase
Glutamate
Grain Dust
Gram-Negative Bacteria
Grass Pollen
Group-A Beta-Haemolytic Streptococcus
H1N1
HBV
HCV
Heat Shock Protein 65

Hepatitis B Virus
Hepatitis C Virus
Histamine
HIV
HIV-1
House Dust Mite
HPV-16 E7
HT-2
Human Cytomegalovirus
Human Herpesvirus 8
Human Immunodeficiency Virus
Human Leucocyte Antigen G
Human Papillomavirus
Human Respiratory Syncytial Virus
Human Rhinovirus
Indoxacarb
Influenza A Virus Protein PB1-F2
Influenza Virus
Interleukin-10
Kainic Acid
Kalitoxin
Kaposi's Sarcoma-Associated Herpesvirus
Ketones
Lacto-N-Fucopentaose3
Lichen Planus
Lipopolysaccharides
Lymphocytic Choriomeningitis Virus
M. Tuberculosis
Malondialdehyde
Marek's Disease Virus
Measles Virus Infection
Microcystin-LR
Microcystins
Milky Sap Of F. Carica
Mitomycin
Mitomycin C
Mixed Mold Mycotoxicosis
Moisture-Damaged Buildings
Moniliformin
Monocrotaline
Moraxella Catarrhalis

Mould
Murine Gammaherpes-Virus-68
Mus M 1
Mycobacteria Tuberculosis Adjuvant
Mycobacterium Marinum
Mycobacterium Tuberculosis
Mycobacterium Xenopi
Mycolactone
Mycotoxins
Mycotoxins
Neonatal Infections
Nivalenol
Nodularin
Nomuraea Rileyi
NTHI
Ochratoxin A
Ochratoxin B
Okadaic Acid
Oleic Acid
Opportunistic Infections
Organic Dusts
Ovalbumin
P. Gingivalis
P. Intermedia
Pam3Cys
Pasteurella Haemolytica A1 Lipopolysaccharide
Pathogen-Associated Molecular Patterns
Patulin
Peptidoglycan
Peptidoglycan-Polysaccharide
Pertussis Toxin
Phorbol Ester
Phytoestrogen
Plasmodium
Pollen
Polymethoxylated Flavone Extract
Polyomavirus BK
Porcine Serum
Porphyromonas Gingivalis
Premolis Semirufa
Prevotella Intermedia

Prolactin-Induced Protein
Proteoglycan
Protozoan Parasites
Pseudomonas Aeruginosa
Pseudomonas Exotoxin A
Pteridium Aquilinum
Pteromalus Puparum Venom
Ragweed
Recombinant Interleukin-2
Respiratory Pathogens
Rhein
Rhinovirus
Ribosome Inhibiting Protein
Ricin Toxin A
Rotavirus
Royal Jelly
Rubella
Rubratxin B
S. Intermedius
S. Mutans
S. Aureus
Saporin
Schistosoma Mansoni
Scleroderma Guani Venom
Sepsis
Settled Dust
Shiga Toxin
Simian Immunodeficiency Virus
Sivcpz
Soybean Dust
Spores Of Basidiomycete Fungi
Squalene
Stachybotrys Chartarum
Staphylococcal Enterotoxin B
Staphylococcus Aureus
Staphylococcus Epidermidis

Streptococcus Pneumoniae
Streptococcus Pyogenes
Streptomyces Californicus
Sulfur-Fumigated Polysaccharides From Smilax Glabra Roxb
Superantigens
Swainsonine
T-2 Toxin
Taenia Solium Metacestode
Tat 1-72
Tetanus Toxin
Thalassophryne Nattereri Fish Venom
Thermophilic Actinomycete
Tityustoxin
TLR Ligands Lipopolysaccharide
Toxic Cyanobacteria
Toxoplasma Gondii
Tree Pollen
Trichothecenes
Tripterygium Wilfordii Hook F
Tulipalin A
Type II Collagen
Umbelliferae
Ureaplasma Parvum
Vaccinia Virus
Viral Infections During Pregnancy
Virus-Associated Hematologic Malignancies
Vomitoxin
Wheat Alpha-Amylase Inhibitor
Xanthine Oxidase
Yessotoxins
Zanthoxylamide Protoalkaloids
Zearalenone
Zymosan A

TABLE A4-4. CONTRIBUTING FACTORS TO WEAKENED IMMUNE SYSTEM
(OCCUPATIONAL/ENVIRONMENTAL)

(90)Sr
(Z)-Cis-Bifenthrin
1,1,1-Trichloro-2,2-Bis(4-Methoxyphenyl)Ethane
1,1,1-Trichloro-2,2-Bis(P-Chlorophenyl)Ethane
1,1,1-Trichloroethane
1,1-Dichloro-2,2-Bis(P-Chlorophenyl)Ethane
1,1-Dichloro-2,2-Bis(P-Chlorophenyl)Ethene
1,1-Dichloroethylene
1,2,3,4,6,7,8-Heptachlorodibenzo-P-Dioxin
1,2,3,4,7-Pentachlorodibenzofuran
1,2,3,7,8-Pentabromodibenzo-P-Dioxin
1,2,3,7,8-Pentachlorodibenzo-P-Dioxin
1,2,3,7,9-PeCDF
1,2,4-Benzenetriol
1,2:5,6-Dibenzanthracene
1,2-Dibromopropane
1,2-Dichloroethane
1,2-Dimethylhydrazine
1,3,6,8-TCDF
1,3-Butadiene
1,3-Dibromopropane
1,4-Bis [(2-Aminoethyl)Amino]-5,8-Dihydroxy-9,10-Anthracenedione Dihydrochloride
1.8 GHz Electromagnetic Fields
12-Methylbenz[a]Anthracene
17alpha-Ethynylestradiol
17alpha-Methyltestosterone
1-Bromobutane
1-Bromopropane
1-Chloro-4-(Trifluoromethyl)Benzene
1-Methyl-3-Octylimidazolium Bromide
1-Methyl-4-Phenyl Pyridinium
1-Methyl-4-Phenyl-1,2,3,6-Tetrahydropyridine
2,2',4,4'-Tetra-Bromodiphenyl Ether
2,2',4,6,6'-Pentachlorobiphenyl
2,3',4,4',5-Pentachlorobiphenyl
2,3,4,7,8-PeCDF
2,3,4,7,8-Pentachlorodibenzofuran
2,3,5,6-Tetrachloro-4-(Methylsulphonyl)Pyridine
2,3,7,8-Tetrabromodibenzo-P-Dioxin
2,3,7,8-Tetrachlorinated Dibenzo-P-Dioxin
2,3,7,8-Tetrachlorodibenzodioxin

2,3,7,8-Tetrachlorodibenzofuran
2,3,7,8-Tetrachlorodibenzo-P-Dioxin
2,3-Dichloro-1-Propanol
2',3'-Dideoxyinosine
2,3-Dihydro-2,2-Dimethyl-7-Benzo-Furanol N-Methylcarbamate
2,4,6-Tribromophenol
2,4,6-Trichlorophenol
2,4,6-Triiodophenol
2,4,6-Trinitrobenzene Sulfonic Acid
2,4,6-Trinitrophenyl-N-Methyl-Nitramine
2,4,6-Trinitrotoluene
2,4,6-Triphenyl-4H-Selenopyrane
2,4-Diaminotoluene
2,4-Dichlorophenol
2,4-Dichlorophenoxyacetic Acid
2,4-Dinitrofluorobenzene
2,5-Hexanedione
2,6,10,14-Tetramethylpentadecane
2,7-Dichlorodibenzo-P-Dioxin
2100-Mhz Radiofrequency Radiation
2450-Mhz Microwave
2-Acetyl-4(5)-(1,2,3,4-Tetrahydroxybutyl)-Imidazole
2-Acetylaminofluorene
2-Amino-1-Methyl-6-Phenylimidazo[4,5-b]Pyridine
2-Aminoanthracene
2-Bromopropane
2-Mercaptobenzothiazole
2-Methoxyacetic Acid
2-Methoxyethanol
2-Methoxyethyl Acetate
2-Octynoic Acid
3-(2-Chloroethyl)-2(2-Mesyloxyethylamino)-Tetrahydro-2H-1,3,2-Oxazaphosphorine-2-Oxide
3-(3,4-Dichlorophenyl)-1,1-Dimethylurea
3,3',4,4',5,5'-Hexabromobiphenyl
3,3',4,4',5,5'-HexaCB
3,3',4,4',5-PentaCB
3,3',4,4',5-Pentachlorobiphenyl
3,3',4,4'-TetraCB

3,3',4,4'-Tetrachloroazobenzene
3,3',4,4'-Tetrachloroazoxybenzene
3,4,3',4'-Tetrachlorobiphenyl
3,4,5,3',4',5'-Hexabromobiphenyl
3,4,5,3',4',5'-Hexachlorobiphenyl
3,4-Dichloroaniline
3,4-Dichloropropionanilide
3,4-Dichloropropionaniline
3-Methyl-4-Nitrophenol
3-Methylcholanthrene
3-Monochloro-1,2-Propanediol
3-Phenoxybenzoic Acid
4-(Methylnitrosamino)-1-(3-Pyridyl)-1-Butanone
4,4'-Thiobis-(6-t-butyl-m-cresol)
460-Mhz Microwaves
4-Dimethylamino-3-Methyl-N-Carbamate
4-Hydroxy-2-Nonenal
4-Hydroxydiclofenac
4-Methylanisole
4-Nitroquinoline-1-Oxide
4-Nonylphenol
4-Pentylphenol
5-(3-3-Dimethyl-1-Triazeno)Imidazole-4-Carboxamide
50 Hz Amplitude-Modulated 2.45 GHz Microwaves
6:2 Fluorotelomer Sulfonamide Alkylbetaine
6:2 FTAB
60Cgamma Radiation
6-Hydroxydopamine
6-Mercaptopurine
6-Propyl-2-Thiouracil
7,12-Dimethylbenz(A)Anthracene
8:2 Fluorotelomer Alcohol
835 Mhz Radiofrequency
9-(2-Hydroxyethoxymethyl)Guanine
9,10-Dimethylanthracene
900 MHz Radiofrequency Radiation
915-MHz Microwave Radiation
Abamectin
Abandoned Oil Refinery
Abestos
Acephate
Acer3 Deficiency
Acetaldehyde

Acetamidrid
Acetochlor
Acetofenate
Acetone
Acetoxydimethylnitrosamine
Acetyldinaline
Acid Water
Acrolein
Acrylamides
Acrylonitrile
Activated Carbon
Activated-Sludge
Adamsite
Agent Orange
Agrochemicals
Air Pollutants
Air Pollution
Airborne Particles
Airborne Particulate Matter
Airborne Suspended Matter
Al Citrate
Alachlor
Aldicarb
Alkylphenol Polyethoxylates
Alkylphenols
Alpha3(IV) Collagen
Alpha-Cypermethrin
Alpha-Naphthyl-AS-Acetate Esterase
Alpha-Naphthyl-Butyrate Esterase
Altered Oxygen Supply
Alumina Nanoparticles
Aluminium
Aluminium Chloride
Aluminum
Aluminum Chloride
Aluminum Hydroxide
Aluminum Sulfate
Aluminum Trichloride
Aluminum-Based Nanoparticles
Ambient Particulate Matter
Aminocarb
Amitraz
Ammonia
Ammonium Hexachloroplatinate
Ammonium Metavanadate

Amyl Nitrite
Anhydride
Anthracene
Antigravitary Posture
Antimony
Aqueous Fraction Of PW
Arabian Crude Oil
Arc Welding Fume
Arecoline
Aroclor 1254
Aroclor 1260
Aroclor-1242
Aroclor-1248
Aroclors
Aromatic Amino Compounds
Aromatic Halogenated Disinfection Byproducts
Aromatic Hydrocarbon Receptor Agonists
Aromatic Hydrocarbons
Aromatic Nitro Compounds
Arsenate
Arsenic
Arsenic Trioxide
Arsenite
Arsenobetaine
Aryl-Triazene Derivatives
Asbestos
Atmospheric Pollution
Atrazine
Aurothiopropanol-Sulfonate
Aurothiopropanol-sulfonate Sodium Salt
Avermectin
BDE-99
Be Aluminum
Be Oxide
Bendiocarbamate
Bentazon TP
Bentazone
Benz(a)Anthracene
Benz(a)Pyrene
Benzalkonium Chloride
Benzanthrone
Benzene
Benzenes
Benzethonium Chloride
Benzo [a]Pyrene

Benzo[a]Pyrene-7,8-Dihydrodiol
Benzo[b]Fluoranthene
Benzo[k]Fluoranthene
Benzo-1,4-Quinones
Benzodiazepines
Benzothiazole
Benzyl 3-Quinuclidylate
Benzyl Alcohol
Beryllium
Beta-Chlorolactic Acid
Beta-Cypermethrin
Beta-N-Methylamino-L-Alanine
Bi2Se3 Nanoparticles
Bifenthrin
Biological
Biomass Smoke
Bioprotein Nucleic Acid Reduced Variant
Biphenyls
Bis(2-Chloroethyl) Sulfide (HD)
Bis(Tri-N-Butyltin)Oxide
Bismuth Selenide
Bisphenol A
Bisphenol F
Bisphenol S
Bivalent Ionic Mercury
Bleached Kraft Pulp Mill Effluent
Boric Acid
Boron Nitride Nanoflakes
Branched Polyethylenimine Nanoparticles
Brominated Diphenyl Ethers
Brominated Tetra-Bde
Bromodichloromethane
Burn
Butachlor
Butyltins
C60 Nanoparticles
Cadmium
Cadmium Acetate
Cadmium Chloride
Cadmium Nanoparticles
Cadmium Oxide
Cadmium Telluride Quantum Dots
Caramel Colour III
Carbamate Pesticides
Carbaryl

Carbendazim
Carbofuran
Carbon Black Nanoparticles
Carbon Disulfide
Carbon Fullerenes
Carbon Ion Radiation
Carbon Monoxide
Carbon Nanoparticles
Carbon Nanotubes
Carbon Tetrachloride
Carbosulfan
Carboxylic Acid-Coated Qds
Carpet Shampoo
Cathelicidin
Caustic Soda
CdS/CdTe Quantum Dots
CdSe/ZnS Quantum Dots
CdTe Quantum Dots
CeCl ₃
Cellphone Electromagnetic Radiation
Cement Kiln Dusts
Chemical Pollutants
Chemical Stress
Chemical Warfare Agents
Chemical Weapon
Chemically Dispersed Oil
Chiral Organophosphorus Pesticides
Chit
Chlordanes
Chlorfenvinphos
Chloridazone
Chlorinated Aromatic Hydrocarbons
Chlorinated Carbohydrates
Chlorinated Dibenzodioxins
Chlorinated Dibenzofurans
Chlorinated Dibenzo-P-Dioxins
Chlorinated Flame Retardant
Chlorinated Hydrocarbons
Chlorinated Pesticides
Chlorine
Chloroacetophenone
Chlorobenzenes
Chloroform
Chloronitrobenzenes
Chlorophenols

Chloroplatinic Acid
Chlorothalonil
Chlorpyrifos
Chromate (VI)
Chromium
Chrysene
CI-994
Cigarette Smoke
Cis-Bifenthrin
Cis-Nonachlor
Citral
Citral Dimethyl Acetal
Clark I
Clethodim
Clothianidin
CO ₂
Coal Fly Ash
Coal Tar
Cobalt
Cobalt Chloride
Cocaethylene
Cold
Cold Stress
Cold Water Stress
Constant Illumination
Constant Light
Contact Lenses
Coplanar Polychlorinated Biphenyls
Copolymer-I
Copper
Copper Alginate Fibers
Copper Carbonate Nanoparticles
Copper Chloride
Copper Nanoparticles
Copper Oxide Nanoparticles
Copper Sulfate
Corexit 9500
Corexit/Oil Mixture
Cosmic Radiation Overexposure
Cotton Dust
Crassin Acetate
Crotonaldehyde
Crude Oil
Crystalline Silica
Cumene Hydroperoxide

Cyanuric Acid
Cyclosporin A
Cypermethrin
Dapsone
D-Cyphenothrin
DDT
De-71
Decabrominated Diphenyl Ether
Dechlorane 602
Decimeter Waves
Decimeter-Band Electromagnetic Field
Dehydroabietic Acid
Deltamethrin
Dental Amalgam
DEP Benzene Extracts
Dermal Bioimplants
Dextran Sodium Sulfate
Dextran Stabilized Iron Oxide Nanoparticles
Dextran Sulfate
Di-(2-Ethylhexyl) Phthalate
Diazinon
Dibenz(a,c)Anthracene
Dibenz(a,h)Anthracene
Dibenzo[Def,P]Chrysene
Dibenzofuranes
Dibenzofurans
Dibenzo-P-Dioxins
Dibenzopyrene
Dibromoacetic Acid
Dibutyl Phthalate
Dibutyltin
Dichlofluanid
Dichloroacetic Acid
Dichlorodiphenyldichloroethylene
Dichlorodiphenyltrichloroethane
Dichloroethane
Dichloromethane
Dichlorophene
Dichloropropanol
Diclofop-Methyl
Dicyclohexylphthalate
Dieldrin
Diesel Exhaust
Dietary Nickle Chloride
Diethanolamine

Diethyldithiophosphate
Dihydroxy-Di-N-Propylnitrosamine
Diisononylphthalate
Diisopropyl Ether
Dim Light At Night
Dimethoate
Dimethyl Carbonate
Dimethyl Dichlorovinyl Phosphate
Dimethyl Nitrosamine
Dimethyl Sulfoxide
Dimethylbenz(A)Anthracene
Dimethylformamide
Dimethylnitrosamine
Dimethylsulphoxide
Di-n-Butyltin Dichloride
Dinocap
Di-n-Octyltin Dichloride
Dinotefuran
Dioxin-Like Polychlorinated Biphenyls
Dioxins
Diphenols
Diphenyl Ethers
Diphenylmethane Diisocyanate
Disinfection Byproducts
Disperse Red 1
Dithiocarbamates
Diuron
Domestic Wastewaters
D-Phenothrin
Electromagnetic Field
Electromagnetic Radiation
Electromagnetic Waves
Electronic Waste
Endocrine Disrupting Compounds
Endosulfan
Endosulfane
Endrin
Engine Exhausts
Engineered Nanomaterials
Environmental Chemicals
Environmental Estrogens
Environmental Pollutants
Epichlorohydrin
Erionite
Esfenvalerate

Ethanol
Ethephon
Ethyl Benzene
Ethyl Carbamate
Ethyl T-Butyl Ether
Ethylene Dibromide
Ethylene Glycol
Ethylene Oxide
E-Waste Disposing Areas
Exhaust Gases
Extremely High Frequency
Famoxadone-Cymoxanil
Fenitrothion
Fenthion
Fenvalerate
Ferrocenes
Fine Particulate Matter
Fipronil
Firefighting Overhaul Environment
Fluoranthene
Fluorides
Fluoro-Edenite Fibers
Fluorotelomer
Fluvalinate
Fly Ash
Footshock
Forafac1157
Formaldehyde
FR167653
Fuel Oil
Fullerene Nanoparticles
Furans
Furfurol
Furfuryl Alcohol
Furniture Dust
Furosemide
Gallium
Gallium Arsenide
Gamma Radiation
Gamma-Chlordane
Gamma-Hexachlorocyclohexane
Gasoline
Gasoline Exhaust Particles
Geogenic Dust
Geogenic Particulate Matter

Global Warming
Glucan Nanoparticles
Glufosinate-Ammonium
Glutaraldehyde
Glycidamide
Glycol Ether 2-Methoxyethanol
Glyphosate
Gold
Gold Nanoparticles
Gold-Salt
Graphene Nanoplatelets
Graphene Oxides
Guaiacol
Halocarbons
Halogenated Aromatic Hydrocarbons
Halogenated Benzo-1,4-Quinone
Hapten
Hardwood Smoke
HCC-230fa (1,1,1,3,3,3-Hexachloropropane)
Head-Down Tilt Bed Rest
Heat
Heat Stress
Heavy Crude Oil
Heavy Mechanical Trauma
Heavy Metals
Heavy Oil
Hepatotoxic Chemicals
Hepatotoxicants
Heptachlor
Hexachlorobenzene
Hexachlorocyclohexanes
Hexachloroethan
Hexahydrophthalic Anhydride
High Altitude
High Frequency Electromagnetic Radiation
High Temperature
High Water Temperature
High-Dose Sunlight
Highly Chlorinated Biphenyls
Hospital Wastewaters
Hydrazine
Hydrocarbon Oil
Hydrogen Peroxide
Hydrogen Sulfide

Hydrophobic Sodium Fluoride-Based Nanocrystals Doped With Lanthanide Ions
Hydrophobicity
Hydroquinone
Hydroxylated Fullerenes
Hypergravity
Hyperoxia
Hypoxanthine
Hypoxia
Imidacloprid
Imiprothrin
Indeno[1,2,3,c,d]Pyrene
Indium
Indole-3-Butyric Acid
Indoxyl Sulfate
Industrial Aerosols
Industrial Noise
Industrial Organic Solvents
Inhaled Particles
Intense Sound
Iodine Excess
Iodine Gadital
Ionizing Radiation
Iron
Iron Nanoparticles
Iron Oxide Nanoparticles
Iron-Containing Compounds
Irradiation
Isocyanates
Isophorone Diisocyanate
Jet Fuel
Jet-A
JP-8
Lactic Acid
Lambda-Cyhalothrin
Lanthanoids
Lead
Lead Acetate
Lead Nitrate
Leptophos
Lewisite
Lindane
Lipid-Based Nanoparticles
Lithium
Lithium Carbonate

Lithium Chloride
Long-Haul Flight
Low-Frequency High-Intensity Magnetic Field
Low-Frequency Noise
Magnesium Sulfate
Malathion
Mancozeb
Manganese
Matacil
Mechanical Ventilation
Mecoprop
Melamine
Mercuric Chloride
Mercury
Meso-2,3-Dimercaptosuccinic Acid
Mesoporous Silica Nanoparticles
Metal Nanoparticles
Metallic Mercury Vapor
Metal-Oxide Nanoparticles
Metals
Metalworking Fluid
Meta-Nitrotoluene
Methacrylate
Methamidophos
Methanol
Methoxychlor
Methyl Bromide
Methyl Chloride
Methyl Ethyl Ketone
Methyl Eugenol
Methyl Isocyanate
Methyl Methanesulfonate
Methyl Tertiary-Butyl Ether
Methylmercury
Methylmercury Chloride
Methylmercury Sulfide
Methylnitrosourea
Methyl-N-Nitrosourea
Methylparathion
Methyltetrahydrophthalic Anhydride
Metribuzin
Microcrystalline Cellulose
Microgravity
Microparticles
Microplastics

Microwaves
Millimeter-Wave
Mineral Dust
Mineral Oil Distillate D-11
Mineral Oils
Mining
Mirex
M-Nitrotoluene
Moisture-Damage
Mono-2-Ethylhexyl Phthalate
Mono-Iso-Decyl Phthalate
Mono-Iso-Nonyl Phthalate
Monomethoxy(Polyethyleneglycol)-Poly (D,L-Lactic-Co-Glycolic Acid)-Monomethoxy (PELGE) Nanoparticles
Monomethylarsonous Acid
Mono-N-Octyl Phthalate
Monophthalates
Monosodium Urate Monohydrate Crystal
Multiwalled Carbon Nanotubes
Municipal Wastewaters
Mustard Oil
N,N,-Diethyl-M-Toluamide
N,N1-Bis(Dichloroacetyl)-1,8-Octamethylene Diamine
N,N-Diethylaniline
N,N-Diethyl-M-Toluamide
N-Acetylneuraminic Acid
Nanoceria Nanoparticles
Nanomaterials
Nanoparticle Protein Corona (NP-PC)
Nanoparticles
Nanoparticulate TiO ₂
Nanoplastic Particles
Nanoshells
Nanosilicas
Nanosilver
Naphthalenes
Naphthenic Acids
N-Bis (2-Hydroxypropyl) Nitrosamine
N-Butylbenzene Sulfonamide
N-Butyl-N-(4-Hydroxybutyl) Nitrosamine
NdCl ₃
Neb-Colloostatin

Negatively Charged-Particle Dominant Indoor Air-Conditions
Neonicotinoids
N-Ethyl, N-Nitrosourea
Neutron Irradiation
NH ₄ VO ₃
N-Hexane
Nickel
Nickel Aerosols
Nickel Nanoparticles
Nickel Oxide
Nickel Subsulfide
Nickel Sulfate Hexahydrate
NiCl ₂
Nicotinamide
Nicotine
Niridazole
Nitenpyram
Nitrite
Nitrobenzene
Nitrofurazone
Nitrogen Dioxide
Nitrogen Oxides
Nitrosamines
Nitrosomethylurea
Nitrous Oxide
N-Methyl-D-Aspartate
N-Methyl-N'-Nitro-N-Nitrosoguanidine
N-Methyl-N-Nitrosourea
N-Nitrosodibutylamine
N-Nitrosodiethylamine
N-Nitrosodimethylamine
N-Nitrosodipropylamine
N-Nitrosomethylbutylamine
N-Nitrosomethylethylamine
N-Nitrosomethylpropylamine
N-Nitroso-N-Methylurea
Noise
Non-Halogenated P-Benzo-1,4-Quinone
Nonoxynol-9
Nonylphenol
O,O,S-Trimethyl Phosphorothioate
O,O-Diethyl-O-4-Nitro-Phenylthiophosphate
O,O-Dimethyl, S-Ethyl Phosphorothioate
O,P-Dichlorodiphenyldichloroethylene

O,S-Dimethyl-Acetylphosphoramidothioate
O3-Degraded AA
Ocean Acidification
Oil Exposure
Oil Fly Ash
Oil Mist
Oil Sands Process Water
Oil Sands Tailings Water
Oil Sands-Derived Naphthenic Acids
Oil Spills
O-Isopropyl Methylphosphonofluoridate
Oleic Acid Anilide
Omethoate
O-Nitroanisole
Orange II
Ordnance
Organic Acid Anhydrides
Organic Hydrocarbons
Organic Pollutants
Organic Solvents
Organochlorine Compounds
Organochlorine Contaminants
Organochlorine Insecticide
Organochlorine Pesticides
Organohalogen Flame Retardant
Organophosphate Flame Retardants
Organophosphorous Pesticides
Organophosphorus Compounds
Organosilicon Compounds
Organotin Compounds
Ortho-Phenylphenol Salt
Ortho-Phthalaldehyde
OS Leachate
Otrganic Perfluorochemicals
Ouabain
Oxazolone
Oxidant Gases
Ozone
P,P'-Dichlorodiphenyldichloroethylene
Paints
Palladium
Palmitoleic Acid
Palmyrah
PAMAM Dendrimers
Pancreatic Enzymes

Paper And Pulp Mill Effluent
Parabens
Para-Nitrotoluene
Paraquat
Parathion
Particulate Matter
Passive Smoking
Pb-Acetate
PBDE-209 Exposure During Pregnancy
P-Bromophenylacetylurea
PCB118
PCB126
PCB153
PCB169
PCBs
P-Chloroaniline
P-Chloronitrobenzene
P-Dichlorobenzene
Pendimethalin
Pentabromodiphenyl Ether
PentaCB
Pentachlorophenol
Perchloroethylene
Perfluorinated Alkylated Substances
Perfluorinated Compounds
Per-Fluoroalkyl
Perfluoroalkyl Acids
Perfluoroalkyl Carboxylates
Perfluoroalkyl Substances
Perfluoro-N-Decanoic Acid
Perfluorononanoic Acid
Perfluorooctane Sulfate
Perfluorooctane Sulfonate
Perfluorooctane Sulfonic Acid
Perfluorooctanoate
Perfluorooctanoic Acid
Perfluorooctanoic Sulfonic Acid
Perinatal Chemical Exposures
Permanone
Permethrin Exposure
Persistent Organic Pollutants
Persistent Organochlorine Compounds
Pesticides
Petrochemical Waste Sites
Petrochemical Wastes

Petrochemicals
Petroleum
PFAS
PFOA
PFOS
PHAHS
Pharmaceuticals
Phenanthrene
Phenol
Phenols
Phenoxyphenols
Phenyl Arsenic Compounds
Phosgene
Phosphamidon
Phthalates
Physical Fatigue
Physiological Factors
Physiological Stress
Picoxystrobin
Piperonyl Butoxide
Pirimicarb
Pirimiphos-Methyl (O-2-Diethylamino-6-Methylpyrimidin-4-Yl O,O-Dimethyl Phosphorothioate)
Platinum Nanoparticles
Plutonium
PM2.5
P-Nitroaniline
P-Nitrotoluene
Pollutants
Poly (Lactic-Co-Glycolic Acid) Nanoparticles
Poly(Carboxybetaine) Nanoparticles
Poly(D,L-Lactic Acid) Nanoparticle
Poly(Ethylene Glycol) Nanoparticles
Polyamidoamine Dendrimers
Polyaromatic Hydrocarbons
Polybrominated Biphenyls
Polybrominated Diphenyl Ethers
Polybrominated Flame Retardants
Polycarbonate
Polychlorinated Biphenyl 153
Polychlorinated Biphenyl Congeners
Polychlorinated Biphenyl Mixtures
Polychlorinated Biphenyls
Polychlorinated Dibenzofurans

Polychlorinated Dibenzo-P-Dioxins
Polychlorinated Dioxins
Polychlorinated Diphenyl Ethers
Polychlorinated Naphthalenes
Polycyclic Aromatic Hydrocarbons
Polycyclic Aromatics
Polycyclic Hydrocarbons
Polyethylene Microplastics
Polyfluorinated Compounds
Polyfluoroalkyl
Polyhalogenated Aromatic Hydrocarbons
Polyhalogenated Biphenyls
Polyhalogenated Hydrocarbons
Polyinosinic:Polycytidylic Acid
Polymeric Nanoparticles
Polynuclear Aromatic Hydrocarbon
Polyphosphoester-Based Nanoparticles
Polyriboinosinic-Polyribocytidilic Acid
Polystyrene
Polyurethane
Polyvinyl Chloride
Pond Sediments
Potassium Bromate
Potassium Salt
Potassium Sorbate
Potassium Tetrachloroplatinate
P-Phenylenediamine
Prallethrin 1.6%
Prenatal Arsenic Exposure
Prenatal Trichloroethylene
Pretilachlor
Produced Water
Propanil
Propoxur
Propoxur
Propyl Gallate
Prowl 400
Pulp Mill Effluent
Pulse Modulated Radiofrequency
Punicalagin
Pyraclofos
Pyraclostrobin
Pyrene
Pyrethroid Insecticides
Pyrethroid Metabolites

Pyrethroids
Pyridostigmine Bromide
Pyrocatechol
Pyrrolizidine Alkaloids
Quartz
Quinocetone
Quinolinic Acid
Quinones
Radio Frequencies
Radioactive Isotopes
Radioactivity
Radiocontrast Media
Radiofrequency Radiation
Radioiodine-131
Radiotelevision Broadcasting Stations
Radiotherapy
Residual Oil Fly Ash
Resin Glass Ionomers
Respiratory Syncytial Virus
Retinal Laser Burn
Roundup
Salinity Change
Salt Dust
Sand Dust
Sarin
Scum Of Waste Crankcase Oil
Secondhand Smoke
Selenium
Sephadex
Sertraline
Silesian Dust
Silica
Silica Nanoparticles
Silicates
Silicon Dioxide Nanoparticles
Silicone
Silver
Silver Acetate
Silver Nanoparticles
Simazine
Single-Walled Carbon Nanotubes
SiO ₂ Nanocomposites
Sodium Acetate
Sodium Arsenite
Sodium Bromate

Sodium Carbonate
Sodium Chromate(VI)
Sodium Dodecyl Sulfate
Sodium Fluoride
Sodium Methylthiocarbamate
Sodium Ortho-Phenylphenol Salt
Sodium Tungstate
Solar-Simulated Radiation
Solvents
Soman
Space Radiation
Spinal Cord Injury
Spinetoram
Stack Gas Condensates From Waste Incineration Plants
Stannous Chloride
Stomp
Strobilurins
Styrene
Styrene-Butadiene Rubber Production
Sulfluramid
Sulfoxaflor
Sulfur Dioxide
Sulfur Yperite
Sulfuric Acid
Sunset Yellow FCF
Supercypermethrin Forte
Suspended Particulates
Sweet Crude Oil
Tannery Effluent
Tannins
Tartrazine
Tcms Pyridine
Tebuconazole
Terahertz Radiation
Tert-Butylhydroquinone
Tertiary-Butyl Acetate
Tetrabromobisphenol A
Tetrabromoethylcyclohexane
Tetrachlorodiarlymethanes
Tetrachloroethylene
Tetrachloromethane
Tetraethyl Lead
Tetramethoxypropane
Tetraphenyl Arsonium Chloride

Tetryl
Thermal Injury
Thiabendazole
Thiamethoxam
Thimerosal
Thioacetamide
Thymidine Dinucleotides
Thymol
Ti Ascorbate
Ti Oxalate
Tin
TiO ₂ Composite
Titanium
Titanium Dioxide
Titanium Dioxide Nanoparticles
Titanium Implants
Titanocene
Tobacco Smoke
Toluene
Toluene 2,4-Diisocyanate
Toluene Diisocyanate
Total Particulate Matter
Toxic Waste Sites
Traffic-Related Particles
Trans-Nonachlor
Trauma
Treated Urban Wastewaters
Trehalose Dimycolate
Triallate
Triazine Irgarol 1051
Tributyltin
Tributyltin Chloride
Tributyltin Oxide
Tributyltin-Sulfhydryl
Trichloroacetic Acid
Trichloroethane
Trichloroethylene
Triclosan
Triethanolamine
Trifloxystrobin
Trimellitic Anhydride
Trimethyltin
Tri-N-Butyltin Chloride
Tri-N-Butyltin Oxide
Trinitrobenzene Sulphonic Acid

Trinitrotoluene
Tri-N-Propyltin Chloride
Tri-Ortho-Cresyl Phosphate
Tri-Ortho-Tolyl Phosphate
Triphenylphosphate
Triphenyltin
Triphenyltin Acetate
Triphenyltin Chloride
Triphenyltin Derivatives
Tris(1,3-Dichloroisopropyl) Phosphate
Tropolone
Tungsten
Tungsten Substances
Type A Trichothecenes
Type B Trichothecenes
Uhf Electrical Field
Ultrafine Particulate Matter
Ultraviolet B
Ultraviolet Light
Ultraviolet Radiation
Unsymmetrical Dimethylhydrazine
Untreated Urban Wastewaters
Urban Air Pollution
Urban Waste Water
Urethane
Ustad-10 EC
UVA
UVR
Vanadium
Vanadium Pentoxide
Vehicle Emissions
Vinclozolin
Vinyl Chloride
Vinylidene Chloride
Volatile Organic Compounds
Volcano Mud
VX
Washing Soda
Waterborne Selenium
Welding Aerosols
Welding Fumes
Whole-Body Vibration
Whole-Smoke Conditioned Medium
Wide-Band Modulated Electromagnetic Field
Xenobiotics

Xylene
Zinc
Zinc Chloride

Zinc Oxide Nanoparticles
Zinc Pyrithione
Ziram

TABLE A4-5. CONTRIBUTING FACTORS TO WEAKENED IMMUNE SYSTEM
(PSYCHOSOCIAL/SOCIOECONOMIC)

Accumulated Life Stress
Acute Psychological Stressors
Adverse Life Events
Anxiety
Anxious Women
Childhood Adversity
Chronic Life Stress
Chronic Mild Stress
Chronic Restraint Stress
Chronic Social Stress
Chronic Stress
Combined Stress
Depression
Disaster
Distress
Intense Intellectual Stress
Life Stress

Male Partner Violence
Mild Stress
Negative Stressful Life
Posttraumatic Stress
Psycho-Emotional Stress
Psychological Stress
Restraint Stress
Social Behaviour Deficits
Social Disruption
Social Isolation
Social Stress
Stress
Stressful Life Events
Stress-Related Behavior
Traumatic Life Events
Vulnerability
Work Stress

A4-B. Bibliography – Contributing Factors to Weakened Immune System – Titles Only

As stated in the previous section, approximately 4,700 records included factors that contributed to weakening the immune system, and these records formed the basis of the analysis. The titles of these records follow. To retrieve the abstract, or in some cases the full-text of these records, insert the title shown below into Pubmed.

18beta-Glycyrrhetic acid from licorice root impairs dendritic cells maturation and Th1 immune responses

192IgG-saporin-induced immunotoxic lesions of cholinergic basal forebrain system differentially affect glutamatergic and GABAergic markers in cortical rat brain regions

2,2',4,6,6'-Pentachlorobiphenyl-induced apoptosis is limited by cyclooxygenase-2 induction

2,3,7,8-TCDD neurotoxicity in neuroblastoma cells is caused by increased oxidative stress, intracellular calcium levels, and tau phosphorylation

2,3,7,8-Tetrachlorodibenzo-p-dioxin affects the differentiation of CD4 helper T cell

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) and long term immunologic memory

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) induced suppression of the local immune response

2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)-induced immunotoxicity

2,3,7,8-Tetrachlorodibenzo-p-dioxin impairs stable establishment of oral tolerance in mice

2,3,7,8-Tetrachlorodibenzo-p-dioxin-mediated impairment of B cell differentiation involves dysregulation of paired box 5 (Pax5) isoform, Pax5a

21 Days head-down bed rest induces weakening of cell-mediated immunity - Some spaceflight findings confirmed in a ground-based analog

2'3'-Dideoxyinosine inhibits the humoral immune response in female B6C3F1 mice by targeting the B lymphocyte

25 years of UV-induced immunosuppression mediated by T cells-from disregarded T suppressor cells to highly respected regulatory T cells

2-Methoxyestradiol protects against IgG immune complex-induced acute lung injury by blocking NF-kappaB and CCAAT/enhancer-binding protein beta activities

3,3'-Diindolylmethane induces immunotoxicity via splenocyte apoptosis in neonatal mice

3,4-Dichloropropionanilide-induced atrophy of the thymus: mechanisms of toxicity and recovery

3-Methylcholanthrene induces lymphocyte and phagocyte apoptosis in common carp (*Cyprinus carpio* L) in vitro

3-Methylindole-induced splenotoxicity: functional analysis of immune parameters and lymphocyte phenotyping by flow cytometry

51Cr release assay of clozapine-induced cytotoxicity: evidence for immunogenic mechanism

5-azacytidine promotes an inhibitory T-cell phenotype and impairs immune mediated antileukemic activity

6:2 fluorotelomer sulfonamide alkylbetaine (6:2 FTAB), a novel perfluorooctane sulfonate alternative, induced developmental toxicity in zebrafish embryos

6-Methylprednisolone does not impair anti-thymocyte globulin (ATG) immunosuppressive activity in non-human primates

7,12-Dimethylbenz[a]anthracene-induced bone marrow toxicity is p53-dependent

8:2 Fluorotelomer alcohol causes immunotoxicity and liver injury in adult male C57BL/6 mice

954 MHz microwaves enhance the mutagenic properties of mitomycin C.

A 33-year-old patient with human immunodeficiency virus on antiretroviral therapy with efavirenz-induced complex partial seizures: a case report

A case of daptomycin-induced immune thrombocytopenia

A case of drug-induced hypersensitivity syndrome induced by icotinib managed by intravenous immunoglobulin and systemic corticosteroids

A Case of Heparin-Induced Thrombocytopenia with Discrepancy in the Results of Anti-Platelet Factor 4/Heparin Antibodies between Latex-Particle-Enhanced Immunoturbidimetric Assay and Enzyme Immunoassay

A case of inflammatory pseudotumor of the lung with suppressed immune response in the patient with renal cell carcinoma after nephrectomy and administration of interferon

A case of isoniazid-induced thrombocytopenia: recovery with immunoglobulin therapy

A case of linear immunoglobulin A bullous dermatosis in a patient exposed to sun and an analgesic

A case of pembrolizumab-induced type-1 diabetes mellitus and discussion of immune checkpoint inhibitor-induced type 1 diabetes

A case of profound and prolonged tirofiban-induced thrombocytopenia and its correction by intravenous immunoglobulin G

A case of thrombocytopenia induced by digitoxin--antibody immune complex

A clinical and immunologic study of workers with trimellitic-anhydride-induced immunologic lung disease after transfer to low exposure jobs

A commercial sunscreen's protection against ultraviolet radiation-induced immunosuppression is more than 50% lower than protection against sunburn in humans

A comparative evaluation of immunotoxicity of DDT and its metabolites in rats

A comparative evaluation of immunotoxicity of malathion after subchronic exposure in experimental animals

A comparative evaluation of the immunotoxicity and immunomodulatory effects on macrophages exposed to aromatic trihalogenated DBPs

A Comparative Study on the Effects of Different Parts of Panax ginseng on the Immune Activity of Cyclophosphamide-Induced Immunosuppressed Mice

A comparison of immunotoxic effects of nanomedicinal products with regulatory immunotoxicity testing requirements

A Comparison of Two Types of Rabbit Antithymocyte Globulin Induction Therapy in Immunological High-Risk Kidney Recipients: A Prospective Randomized Control Study

A comprehensive review of pesticides and the immune dysregulation: mechanisms, evidence and consequences

A cooperative effect of surgical stress-induced immunomodulation with the cessation of immunosuppression on hepatitis C virus elimination

A critical reappraisal of the current data on drug-induced linear immunoglobulin A bullous dermatosis: a real and separate nosological entity

A critical review of perfluorooctanoate and perfluorooctanesulfonate exposure and immunological health conditions in humans

A cross-sectional study of changes in markers of immunological effects and lung health due to exposure to multi-walled carbon nanotubes

A cytokine cascade including prostaglandin E₂, IL-4, and IL-10 is responsible for UV-induced systemic immune suppression

A detailed study of developmental immunotoxicity of imidacloprid in Wistar rats

A dose-response study of the effects of prenatal and lactational exposure to TCDD on the immune response to influenza A virus

A double-edged sword: does highly active antiretroviral therapy contribute to syphilis incidence by impairing immunity to *Treponema pallidum*

A flow immunoassay for studies of human exposure and toxicity in biological samples

A health food high-peptide meal alleviates immunosuppression induced by hydrocortisone and cyclophosphamide in mice

A high SPF sunscreen's effects on UVB-induced immunosuppression of DNCB contact hypersensitivity

A higher anxiety state in old rats after social isolation is associated to an impairment of the immune response

A high-throughput screening method based on stably transformed human cells was used to determine the immunotoxic effects of fluoranthene and other PAHs

A meta-analysis and morphological review of cyclosporine-induced nephrotoxicity in auto-immune diseases

A method of assessing impairment of immunity after trauma

A model of immune-mediated lung disease in rats sensitized to house dust mite and upregulation of immunity following exposure to nitrogen dioxide

A model of immunologic lung injury induced by trimellitic anhydride inhalation: antibody response

A monoclonal antibody to hippuric acid: an improved enzyme-linked immunosorbent assay for biological monitoring of toluene exposure

A multivariate assessment of innate immune-related gene expressions due to exposure to low concentration individual and mixtures of four kinds of heavy metals on zebrafish (*Danio rerio*) embryos

A murine model of the effects of inhaled CuO nanoparticles on cells of innate and adaptive immunity - a kinetic study of a continuous three-month exposure

A neurotoxic regimen of methamphetamine exacerbates the febrile and neuroinflammatory response to a subsequent peripheral immune stimulus

A new assay system for evaluation of developmental immunotoxicity of chemical compounds using respiratory syncytial virus infection to offspring mice

A new model for an etiology of rheumatoid arthritis: smoking may trigger HLA-DR (shared epitope)-restricted immune reactions to autoantigens modified by citrullination

A new pathologic pathway for pulmonary fibrosis induced by silica: involvement of immunosuppressive responses

A new side effect of immunosuppression: high incidence of hearing impairment after liver transplantation

A nontoxic *Pseudomonas* exotoxin A induces active immunity and passive protective antibody against *Pseudomonas* exotoxin A intoxication

A novel immunochromatographic electrochemical biosensor for highly sensitive and selective detection of trichloropyridinol, a biomarker of exposure to chlorpyrifos

A novel immunosuppressive drug, FTY720, prevents the cancer progression induced by cyclosporine

A novel mouse model of chronic prostatitis/chronic pelvic pain syndrome induced by immunization of special peptide fragment with aluminum hydroxide adjuvant

A novel T(H)17-type cell is rapidly increased in the liver in response to acetaminophen-induced liver injury: T(H)17 cells and the innate immune response

A phase-I study of repeated therapy with radiolabelled antibody to carcinoembryonic antigen using intermittent or continuous administration of cyclosporin A to suppress the immune response

A Potential Mechanism for Immune Suppression by Beta-Adrenergic Receptor Stimulation following Traumatic Injury

A predictive F344 rat immunotoxicology model: cellular parameters combined with humoral response to NP-CgammaG and KLH

A preliminary evaluation of immune stimulation following exposure to metal particles and ions using the mouse popliteal lymph node assay

A prospective, double-blind, randomized study of high-versus low-dose OKT3 induction immunosuppression in cadaveric renal transplantation

A protective effect of vitamin E and selenium in ameliorating the immunotoxicity of malathion in chicks

A proteomic approach for the identification of immunotoxic properties of Tulipalin A

A randomized controlled trial of late conversion from calcineurin inhibitor (CNI)-based to sirolimus-based immunosuppression in liver transplant recipients with impaired renal function

A randomized, double-blinded comparison of Thymoglobulin versus Atgam for induction immunosuppressive therapy in adult renal transplant recipients

A rare case report of acyclovir-induced immune thrombocytopenia with tongue hematomas as the first sign, and a literature review

A review of the immunotoxicity of the pesticide 3,4-dichloropropionanilide

A role for associated transition metals in the immunotoxicity of inhaled ambient particulate matter

A role for HO-1 in renal function impairment in animals subjected to ischemic and reperfusion injury and treated with immunosuppressive drugs

A role for neuropeptides in UVB-induced systemic immunosuppression

A role for oxidative stress in suppressing serum immunoglobulin levels in lead-exposed Fisher 344 rats

A role for reactive oxygen species in endotoxin-induced elevation of MOR expression in the nervous and immune systems

A semiquinone glucoside derivative isolated from *Bacillus* sp. INM-1 provides protection against 5-fluorouracil-induced immunotoxicity

A single dose of trichloroethylene given during development does not substantially alter markers of neuroinflammation in brains of adult mice

A site involving the "hybrid" and PSI homology domains of GPIIIa (beta 3-integrin subunit) is a common target for antibodies associated with quinine-induced immune thrombocytopenia

A soy-derived immunostimulating peptide inhibits etoposide-induced alopecia in neonatal rats

A statement on the developmental immunotoxicity of bisphenol A (BPA): answer to the question from the Dutch Ministry of Health, Welfare and Sport

A study of autoantibodies and circulating immune complexes in mercury-exposed chloralkali workers

A study on behavioral, neurotoxicological, and immunotoxicological effects of subchronic arsenic treatment in rats

A study on geno- and immunotoxicological effects of subacute propoxur and pirimicarb exposure in rats

A study on immunotoxicological effects of subacute amitraz exposure in rats

A study on the effects of exposure to benzene on the activity of immunoglobulin E

A toxicokinetic study of nickel-induced immunosuppression in rats

A UVB wavelength dependency for local suppression of recall immunity in humans demonstrates a peak at 300 nm

Ability of *Lactobacillus plantarum* MON03 to mitigate aflatoxins (B1 and M1) immunotoxicities in mice

Ability of *Lactobacillus rhamnosus* GAF01 to remove AFM1 in vitro and to counteract AFM1 immunotoxicity in vivo

Abnormal immunostaining for dystrophin in isoproterenol-induced acute myocardial injury in rats: evidence for change in dystrophin in the absence of genetic defect

Abnormalities of cellular immune response in arthritis induced by rubella vaccination

Absorption of PCB126 by upper airways impairs G protein-coupled receptor-mediated immune response

Accelerated induction of skin cancers by ultraviolet radiation in hairless mice treated with immunosuppressive agents

Accumulation and immunotoxicity of microplastics in the estuarine worm *Hediste diversicolor* in environmentally relevant conditions of exposure

Accumulation of polychlorinated biphenyls (PCBs) and evaluation of hematological and immunological effects of PCB exposure on turtles

Accumulation, histopathology and immunotoxicological effects of waterborne cadmium on gilthead seabream (*Sparus aurata*)

Acephate immunotoxicity in White Leghorn cockerel chicks upon experimental exposure

Acetaldehyde accelerates HCV-induced impairment of innate immunity by suppressing methylation reactions in liver cells

Acetaldehyde-serum protein adducts inhibit interleukin-2 secretion in concanavalin A-stimulated murine splenocytes: a potential common pathway for ethanol-induced immunomodulation

Acetaminophen toxicity revisited: is drug-induced hepatotoxicity immune mediated

Acetaminophen-induced immunosuppression associated with hepatotoxicity in mice

Acetylcholinesterase inhibition as a biomarker of adverse effect. A study of *Mytilus edulis* exposed to the priority pollutant chlorfenvinphos

Acetylcholinesterase monoclonal antibody-induced sympathectomy: effects on immune status and acute morphine-induced immunomodulation

Acrylamide induced immunosuppression in rats and its modulation by 6-MFA, an interferon inducer

Acrylamide induces immunotoxicity through reactive oxygen species production and caspase-dependent apoptosis in mice splenocytes via the mitochondria-dependent signaling pathways

Actions of alcohol on immunity and neoplasia in fetal alcohol exposed and adult rats

Activating transcription factor 4 underlies the pathogenesis of arsenic trioxide-mediated impairment of macrophage innate immune functions

Activation-induced T-cell death and immune dysfunction after implantation of left-ventricular assist device

Active immunization with amyloid-beta 1-42 impairs memory performance through TLR2/4-dependent activation of the innate immune system

Acute 3,4-methylenedioxymethamphetamine(MDMA) administration produces a rapid and sustained suppression of immune function in the rat

Acute and subchronic immunotoxicity of p-chloronitrobenzene in mice. I. Effect on natural killer, cytotoxic T-lymphocyte activities and mitogen-stimulated lymphocyte proliferation

Acute and subchronic toxic effects of atrazine and chlorpyrifos on common carp (*Cyprinus carpio* L.): Immunotoxicity assessments

Acute effects of 2-bromopropane and 1,2-dibromopropane on hepatotoxic and immunotoxic parameters in female BALB/c mice

Acute exposure to crotonaldehyde induces dysfunction of immune system in male Wistar rats

Acute exposure to perfluorononanoic acid in prepubertal mice: Effect on germ cell dynamics and an insight into the possible mechanisms of its inhibitory action on testicular functions

Acute exposure to waterborne cadmium induced oxidative stress and immunotoxicity in the brain, ovary and liver of zebrafish (*Danio rerio*)

Acute exposure to ZnO nanoparticles induces autophagic immune cell death

Acute immunoallergic hemolytic anemia induced by sulindac

Acute Immunotoxic Effects of Perfluorononanoic Acid (PFNA) in C57BL/6 Mice

Acute immunotoxicity of gallium to carp (*Cyprinus carpio* L)

Acute immunotoxicity of p-chloronitrobenzene in mice: II. Effect of p-chloronitrobenzene on the immunophenotype of murine splenocytes determined by flow cytometry

Acute infection of mice with highly virulent group B streptococci as a host resistance model for immunotoxicity assessment

Acute inflammation and immunoresponses induced by ortho-phthalaldehyde in mice

Acute kidney injury as the presenting complaint of ceftazidime-induced immune-mediated haemolysis

Acute microplastic exposure raises stress response and suppresses detoxification and immune capacities in the scleractinian coral *Pocillopora damicornis*

Acute myocardial infarction caused by delayed heparin-induced thrombocytopenia and acute immunoreaction due to re-exposure to heparin in a systemic lupus erythematosus patient with HIT antibodies

Acute rejection risk in kidney transplant recipients on steroid-avoidance immunosuppression receiving induction with either antithymocyte globulin or basiliximab

Acute renal failure induced by intravenous immune globulin

Acute symptomatic hypocalcemia from immune checkpoint therapy-induced hypoparathyroidism

Acute systemic DNA damage in youth does not impair immune defense with aging

Acute toxicity of cypermethrin on the juvenile of red claw crayfish *Cherax quadricarinatus*

Adaptive immunity is severely impaired by open-heart surgery

Adiponectin ameliorates dyslipidemia induced by the human immunodeficiency virus protease inhibitor ritonavir in mice

Adipose-Derived Mesenchymal Stem Cells Restore Impaired Mucosal Immune Responses in Aged Mice

Adjuvant and immuno-suppressive effect of six monophthalates in a subcutaneous injection model with BALB/c mice

Adjuvant immunization induces high levels of pathogenic antiphospholipid antibodies in genetically prone mice: another facet of the ASIA syndrome

Adrenal suppression in children with the human immunodeficiency virus treated with megestrol acetate

ADTP vaccine induces temporary immunosuppression correctable by using the immunomodulator purified staphylococcal anatoxin

Advances in immunologic mechanisms of lung inflammation induced by airborne particulate matter

Advances in mechanisms and signaling pathways of carbon nanotube toxicity

Advances in non-carcinogenic toxicity of trichloroethylene

Advances on the immunotoxicity of airborne fine particulate matter (PM_{2.5})

Adverse effects and immune dysfunction in response to oral administration of weathered Iranian heavy crude oil in the rockfish *Sebastes schlegeli*

Adverse experience in childhood as a developmental risk factor for altered immune status in adulthood

Adverse immunological effects and autoimmunity induced by dental amalgam and alloy in mice

Aflatoxin B interferes with the antigen-presenting capacity of porcine dendritic cells

Aflatoxin B1 Induces Immunotoxicity through the DNA Methyltransferase-Mediated JAK2/STAT3 Pathway in 3D4/21 Cells

Aflatoxin B1 invokes apoptosis via death receptor pathway in hepatocytes

Aflatoxin B1 Suppressed T-Cell Response to Anti-pig-CD3 Monoclonal Antibody Stimulation in Primary Porcine Splenocytes: A Role for the Extracellular Regulated Protein Kinase (ERK1/2) MAPK Signaling Pathway

Aflatoxin-related immune dysfunction in health and in human immunodeficiency virus disease

Aflatoxins: characteristics and impact on human health

After TGN1412: recent developments in cytokine release assays

Age and Early Graft Function Relate With Risk-Benefit Ratio of Allogenic Islet Transplantation Under Antithymocyte Globulin-Mycophenolate Mofetil-Tacrolimus Immune Suppression

Age and low levels of circulating vitamin D are associated with impaired innate immune function

Age-associated impairment of antitumor immunity in carcinoma-bearing mice and restoration by oral administration of *Lentinula edodes* mycelia extract

Age-Dependent Effects of Prenatal Dexamethasone Exposure on Immune Responses in Male Rats

Age-related differences in the sensitivity of the fish immune response to a coplanar PCB

Age-related differences in the toxicity of ochratoxin A in female rats

Age-related susceptibility to immunotoxicants: animal data and human parallels

Age-specific immunocompetence of the earthworm *Eisenia andrei*: exposure to methylmercury chloride

Aggravating effects of Asian sand dust on lung eosinophilia in mice immunized beforehand by ovalbumin

Aggravating impact of nanoparticles on immune-mediated pulmonary inflammation

AIDS, drugs of abuse and the immune system: a complex immunotoxicological network

Airborne fungus exposure prior to hospitalisation as risk factor for mould infections in immunocompromised patients

Airway inflammatory and immunological events in a rat model exposed to toluene diisocyanate

Alcohol abuse and *Streptococcus pneumoniae* infections: consideration of virulence factors and impaired immune responses

Alcohol abuse enhances neuroinflammation and impairs immune responses in an animal model of human immunodeficiency virus-1 encephalitis

Alcohol administration during adulthood induces alterations of parvalbumin and glial fibrillary acidic protein immunoreactivity in rat hippocampus and cingulate cortex

Alcohol and hepatitis C virus--interactions in immune dysfunctions and liver damage

Alcohol and HIV decrease proteasome and immunoproteasome function in macrophages: implications for impaired immune function during disease

Alcohol-induced alterations in serum immunoglobulin e (IgE) levels in human subjects

Alcohol-induced changes in the immune response: immunological effects of chronic ethanol intake are genetically regulated

Alcohol-induced suppression of tumor necrosis factor--a potential risk factor for secondary infection in the acquired immunodeficiency syndrome

Alcoholism causes alveolar macrophage zinc deficiency and immune dysfunction

Alemtuzumab induction and sirolimus plus mycophenolate mofetil maintenance for CN1 and steroid-free kidney transplant immunosuppression

Alginate oligosaccharide (AOS) improves immuno-metabolic systems by inhibiting STOML2 overexpression in high-fat-diet-induced obese zebrafish

Alkaline ceramidase 3 deficiency aggravates colitis and colitis-associated tumorigenesis in mice by hyperactivating the innate immune system

Allergic disease, immunoglobulins, exposure to mercury and dental amalgam in Swedish adolescents

Allergic Potential and Immunotoxicity Induced by Topical Application of 1-Chloro-4-(Trifluoromethyl)Benzene (PCBTf) in a Murine Model

Allergy and sensitization during childhood associated with prenatal and lactational exposure to marine pollutants

Allergy-Inducing Chromium Compounds Trigger Potent Innate Immune Stimulation Via ROS-Dependent Inflammasome Activation

Alleviation of lead-induced oxidative stress and immune damage by selenium in chicken bursa of Fabricius

Alleviative effect of licorice on copper chloride-induced oxidative stress in the brain: biochemical, histopathological, immunohistochemical, and genotoxic study

Allogeneic compact bone-derived mesenchymal stem cell transplantation increases survival of mice exposed to lethal total body irradiation: a potential immunological mechanism

Alpha tocopherol protects against immunosuppressive and immunotoxic effects of lead

alpha-Lipoic acid ameliorates oral mucositis and oxidative stress induced by methotrexate in rats. Histological and immunohistochemical study

Alpha-momorcharin possessing high immunogenicity, immunotoxicity and hepatotoxicity in SD rats

Alteration of adipose tissue immune cell milieu towards the suppression of inflammation in high fat diet fed mice by flaxseed oil supplementation

Alteration of basic fibroblast growth factor concentration and immunoreactivity in healing of ethanol-induced gastric mucosal damage: effect of sofalcone

Alterations in neuronal development in the substantia nigra pars compacta following in utero ethanol exposure: immunohistochemical and Golgi studies

Alterations in regulatory T-cells: rediscovered pathways in immunotoxicology

Alterations in the pulmonary and systemic immune response in rats exposed to coal fly ash

Alterations of cytokines and MAPK signaling pathways are related to the immunotoxic effect of perfluorononanoic acid

Alterations of immune functions in barrier disrupted skin by UVB irradiation

Alterations of immunoreactivity in chemical production workers in dependence on dose exposure to toxicants

Alterations of seizure-induced c-fos immunolabelling and gene expression in the rat cerebral cortex following dexamethasone treatment

Altered cytokine production in mice exposed to lead acetate

Altered epithelial density and expansion of bulbar projections of a discrete HSP70 immunoreactive subpopulation of rat olfactory receptor neurons in reconstituting olfactory epithelium following exposure to methyl bromide

Altered helper and suppressor lymphocyte populations in surgical patients. A measure of postoperative immunosuppression

Altered hematological and immunological parameters in silver catfish (*Rhamdia quelen*) following short term exposure to sublethal concentration of glyphosate

Altered hepatic mRNA expression of immune response-associated DNA damage in mice liver induced by potassium bromate: Protective role of vanillin

Altered immunohistochemical localization of basic fibroblast growth factor after bleomycin-induced lung injury

Altered MARCH1 ubiquitination-regulated dendritic cell immune functions during the early stage of zymosan-induced multiple organ dysfunction syndrome (MODS) in mice

Altered or Impaired Immune Response to Hepatitis B Vaccine in WNIN/GR-Ob Rat: An Obese Rat Model with Impaired Glucose Tolerance

Altered serum cytokine and immunoglobulin levels in the workers exposed to antimony

Aluminum adjuvant potentiates gilthead seabream immune responses but induces toxicity in splenic melanomacrophage centers

Aluminum chloride- and norepinephrine-induced immunotoxicity on splenic lymphocytes by activating beta2-AR/cAMP/PKA/NF-kappaB signal pathway in rats

Ambient air pollution associated with suppressed serologic responses to *Pneumocystis jirovecii* in a prospective cohort of HIV-infected patients with *Pneumocystis pneumonia*

Amelioration of 2,4,6-trinitrobenzene sulfonic acid-induced colitis in mice by immunoregulatory dendritic cells

Amelioration of doxorubicin-induced myocardial oxidative stress and immunosuppression by grape seed proanthocyanidins in tumour-bearing mice

Amelioration of Ochratoxin A-induced immunotoxic effects by silymarin and Vitamin E in White Leghorn cockerels

Ameliorative action of *Vernonia cinerea* L. on cyclophosphamide-induced immunosuppression and oxidative stress in mice

Ameliorative effect of nanoencapsulated flavonoid against chlorpyrifos-induced hepatic oxidative damage and immunotoxicity in Wistar rats

Ameliorative Effects of Grape Seed Proanthocyanidin Extract on Growth Performance, Immune Function, Antioxidant Capacity, Biochemical Constituents, Liver Histopathology and Aflatoxin Residues in Broilers Exposed to Aflatoxin B

Amiodarone-induced thyrotoxicosis and thyroid cancer: clinical, immunohistochemical, and molecular genetic studies of a case and review of the literature

Amlodipine-induced immune thrombocytopenia

Ammonia exposure alters the expression of immune-related and antioxidant enzymes-related genes and the gut microbial community of crucian carp (*Carassius auratus*)

Ammonia inhalation impaired immune function and mitochondrial integrity in the broilers bursa of fabricius: Implication of oxidative stress and apoptosis

Ammonia toxicity induces glutamine accumulation, oxidative stress and immunosuppression in juvenile yellow catfish *Pelteobagrus fulvidraco*

Amoxicillin-clavulanic acid-induced linear immunoglobulin A bullous dermatosis: case report and review of the literature

AMP-Conjugated Quantum Dots: Low Immunotoxicity Both In Vitro and In Vivo

Amphotericin-induced stridor: a review of stridor, amphotericin preparations, and their immunoregulatory effects

AMPK agonist downregulates innate and adaptive immune responses in TNBS-induced murine acute and relapsing colitis

Amprenavir-induced maculopapular exanthem followed by desensitization in a patient with late-stage human immunodeficiency virus

Amyloid beta protein in rat soleus muscle in chloroquine-induced myopathy using end-specific antibodies for A beta 40 and A beta 42: immunohistochemical evidence for amyloid beta protein

An action spectrum for ultraviolet radiation-induced immunosuppression in humans

An antibody to morphine as an indicator of chronic morphine intoxication and disrupted immunologic reactivity

An anti-murine CD3 monoclonal antibody with a low affinity for Fc gamma receptors suppresses transplantation responses while minimizing acute toxicity and immunogenicity

An aryl hydrocarbon receptor independent mechanism of JP-8 jet fuel immunotoxicity in Ah-responsive and Ah-nonresponsive mice

An atypical immune-inflammatory disorder secondary to breast implant exposure

An enzyme-linked immunosorbent assay (ELISA) specific for antibodies to TNP-LPS detects alterations in serum immunoglobulins and isotype switching in C57BL/6 and DBA/2 mice exposed to 2,3,7,8-tetrachlorodibenzo-p-dioxin and related compounds

An epidemic ignored. Endometriosis linked to dioxin and immunologic dysfunction

An evaluation of the immunotoxic potential of isobutyl nitrite

An examination of the effect of aerosolized Permanone insecticide on zebra finch susceptibility to West Nile virus

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An Immune Suppression-associated EBV-positive Anaplastic Large Cell Lymphoma With a BRAF V600E Mutation

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Assessment of lymphocyte subpopulations and cytokine secretion in children exposed to arsenic

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Author Correction: Immunotoxicological impact and biodistribution assessment of bismuth selenide (Bi₂Se₃) nanoparticles following intratracheal instillation in mice

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Decreased blood level of beta 2-microglobulin in the employees of a factory which produced polychlorinated biphenyls

Deep sequencing of blood and gut T-cell receptor beta-chains reveals gluten-induced immune signatures in celiac disease

Deficiency of dietary niacin impaired gill immunity and antioxidant capacity, and changes its tight junction proteins via regulating NF-kappaB, TOR, Nrf2 and MLCK signaling pathways in young grass carp (*Ctenopharyngodon idella*)

Deficiency of dietary niacin impaired intestinal mucosal immune function via regulating intestinal NF-kappaB, Nrf2 and MLCK signaling pathways in young grass carp (*Ctenopharyngodon idella*)

Deficient Th1-type immune responses via impaired CD28 signaling in ultraviolet B-induced systemic immunosuppression and the restorative effect of IL-12

Deficit in selective and divided attention associated with cholinergic basal forebrain immunotoxic lesion produced by 192-saporin; motoric/sensory deficit associated with Purkinje cell immunotoxic lesion produced by OX7-saporin

Defining pollen exposure times for clinical trials of allergen immunotherapy for pollen-induced rhinoconjunctivitis - an EAACI position paper

Deflazacort induced stronger immunosuppression than expected

Degradation of superparamagnetic iron oxide nanoparticle-induced ferritin by lysosomal cathepsins and related immune response

DEHP induces immunosuppression through disturbing inflammatory factors and CYPs system homeostasis in common carp neutrophils

Delayed complications of sulfur mustard poisoning in the skin and the immune system of Iranian veterans 16-20 years after exposure

Delayed developmental immunotoxicity of prenatal benzodiazepines

Delayed developmental neuro- and immunotoxicity of benzodiazepines

Delayed discovery, dissemination, and decisions on intervention in environmental health: a case study on immunotoxicity of perfluorinated alkylate substances

Delayed immune-mediated thrombocytopenia after re-exposure to abciximab therapy

Delayed immunologic thrombocytopenia induced by abciximab

Delayed redistribution of CD27, CD40 and CD80 positive B cells and the impaired in vitro immunoglobulin production in patients with non-Hodgkin lymphoma after rituximab treatment as an adjuvant to autologous stem cell transplantation

Deleterious effects in reproduction and developmental immunity elicited by pulmonary iron oxide nanoparticles

Delta-9-tetrahydrocannabinol augments murine retroviral induced immunosuppression and infection

Delta-9-tetrahydrocannabinol enhances breast cancer growth and metastasis by suppression of the antitumor immune response

Deltamethrin Increases *Candida albicans* infection susceptibility in mice

Deltamethrin-Induced Immunotoxicity and its Protection by Quercetin: An Experimental Study

Deltamethrin-induced oxidative stress and mitochondrial caspase-dependent signaling pathways in murine splenocytes

Dendrobium sonia polysaccharide regulates immunity and restores the dysbiosis of the gut microbiota of the cyclophosphamide-induced immunosuppressed mice

Density of CD1a-labeled Langerhans' cells in normal human gingiva and in nifedipine- and immunosuppressive medication-induced gingival overgrowth

Dental Fluorosis and Catalase Immunoreactivity of the Brain Tissues in Rats Exposed to High Fluoride Pre- and Postnatally

Deoxynivalenol (DON) naturally contaminated feed impairs the immune response induced by porcine reproductive and respiratory syndrome virus (PRRSV) live attenuated vaccine

Deoxynivalenol impairs the immune functions of neutrophils

Deoxynivalenol suppresses circulating and splenic leukocyte subpopulations in BALB/c mice: dose response, time course and sex differences

Deoxynivalenol, gut microbiota and immunotoxicity: A potential approach

Deoxynivalenol: mechanisms of action, human exposure, and toxicological relevance

Deoxynivalenol-induced IgA production and IgA nephropathy-aberrant mucosal immune response with systemic repercussions

Depressed immunity and impaired proliferation of hematopoietic progenitor cells in patients with complete spinal cord injury

Depression in caregivers of demented patients is associated with altered immunity: impaired proliferative capacity, increased CD8+, and a decline in lymphocytes with surface signal transduction molecules (CD38+) and a cytotoxicity marker (CD56+ CD8

Depressive symptoms following interferon-alpha therapy: mediated by immune-induced reductions in brain-derived neurotrophic factor

Depressive symptoms lead to impaired cellular immune response

Dermal application of jet fuel suppresses secondary immune reactions

Dermal application of JP-8 jet fuel induces immune suppression

Dermal exposure to jet fuel suppresses delayed-type hypersensitivity: a critical role for aromatic hydrocarbons

Dermatomyositis-like syndrome revealing statin-induced necrotizing autoimmune myopathy with anti-HMGCR antibodies

Detailed immunohistologic evaluation of a methotrexate-induced nodule

Detection of 1,2,4-benzenetriol induced aneuploidy and microtubule disruption by fluorescence in situ hybridization and immunocytochemistry

Detection of benzo[a]pyrene-induced immunotoxicity in orange spotted grouper (*Epinephelus coioides*)

Detection of immunotoxic effects of estrogenic and androgenic endocrine disrupting compounds using splenic immune cells of the female three-spined stickleback, *Gasterosteus aculeatus* (L

Detection of immunotoxicity of benzo[a]pyrene in a subacute toxicity study after oral exposure in rats

Detection of immunotoxicity using T-cell based cytokine reporter cell lines ("Cell Chip

Detection of the effects of repeated dose combined propoxur and heavy metal exposure by measurement of certain toxicological, haematological and immune function parameters in rats

Detection of the mechanism of immunotoxicity of cyclosporine A in murine in vitro and in vivo models

Determination of enantiomeric fractions of cypermethrin and cis-bifenthrin in Chinese teas by GC/ECD

Determination of N7- and O6-methylguanine in rat liver DNA after oral exposure to hydrazine by use of immunochemical and electrochemical detection methods

Determination of the immunotoxic potential of heavy metals on the functional activity of bottlenose dolphin leukocytes in vitro

Determination of the immunotoxic potential of pesticides on functional activity of sheep leukocytes in vitro

Determining the relationship between nanoparticle characteristics and immunotoxicity: key challenges and approaches

Detrimental interactions of neonicotinoid pesticide exposure and bumblebee immunity

Development of a lymphocytic lymphoma during immunosuppressive therapy with azathioprine for systemic lupus erythematosus with renal involvement induced by phenylbutazone

Development of a squamous cell carcinoma mouse model for immunotoxicity testing

Development of non-antibiotic macrolide that corrects inflammation-driven immune dysfunction in models of inflammatory bowel diseases and arthritis

Development of the "Cell Chip": a new in vitro alternative technique for immunotoxicity testing

Development of the murine and human immune system: differential effects of immunotoxicants depend on time of exposure

Development of vigabatrin-induced lesions in the rat brain studied by magnetic resonance imaging, histology, and immunocytochemistry

Developmental and reproductive toxicity testing of vaccines

Developmental atrazine exposure suppresses immune function in male, but not female Sprague-Dawley rats

Developmental exposure to 2,3,7,8 tetrachlorodibenzo-p-dioxin attenuates later-life Notch1-mediated T cell development and leukemogenesis

Developmental exposure to 2,3,7,8 tetrachlorodibenzo-p-dioxin attenuates capacity of hematopoietic stem cells to undergo lymphocyte differentiation

Developmental exposure to bisphenol A modulates innate but not adaptive immune responses to influenza A virus infection

Developmental exposure to lead causes persistent immunotoxicity in Fischer 344 rats

Developmental exposure to the potent aryl hydrocarbon receptor agonist 2,3,7,8-tetrachlorodibenzo-p-dioxin Impairs the cell-mediated immune response to infection with influenza a virus, but enhances elements of innate immunity

Developmental immunotoxicity (DIT): assays for evaluating effects of exogenous agents on development of the immune system

Developmental immunotoxicity in male rats after juvenile exposure to ethanol

Developmental immunotoxicity in male rats after juvenile exposure to di-n-octyltin dichloride (DOTC

Developmental immunotoxicity investigations in the SD rat following pre- and post-natal exposure to cyclosporin

Developmental immunotoxicity of atrazine in rodents

Developmental immunotoxicity of chemicals in rodents and its possible regulatory impact

Developmental immunotoxicity of cocaine and ethanol in postnatal Lewis rats

Developmental immunotoxicity of cyclosporin-A in rats: age-associated differential effects

Developmental immunotoxicity of dexamethasone: comparison of fetal versus adult exposures

Developmental immunotoxicity of di-n-octyltin dichloride (DOTC) in an extended one-generation reproductive toxicity study

Developmental immunotoxicity of ethanol in an extended one-generation reproductive toxicity study

Developmental immunotoxicity of lead in the rat: influence of maternal diet

Developmental immunotoxicity of lead: impact on thymic function

Developmental immunotoxicity of methylmercury: the relative sensitivity of developmental and immune parameters

Developmental immunotoxicity of trichloroethylene (TCE): studies in B6C3F1 mice

Developmental immunotoxicity testing of 4-methyl anisole

Developmental Immunotoxicity, Perinatal Programming, and Noncommunicable Diseases: Focus on Human Studies

Developmental Immunotoxicology of Di-(2-Ethylhexyl)phthalate (DEHP): Age-Based Assessment in the Female Rat

Developmental immunotoxicology of lead

Developmental immunotoxicology: emerging issues

Developmental neurotoxicity and immunotoxicity induced by graphene oxide in zebrafish embryos

Developmental stage-specific changes in immunological biomarkers in male C3H/HeN mice after early life toluene exposure

Developmental toxicity of cadmium in mice. II. Immunotoxic effects

Developmental toxicity of cesium in the mouse

Developmental toxicity of N,N1-bis(dichloroacetyl)-1,8-octamethylene diamine: effects of in utero exposure on the postnatal murine immune system

Developmental toxicity, oxidative stress and immunotoxicity induced by three strobilurins (pyraclostrobin, trifloxystrobin and picoxystrobin) in zebrafish embryos

Developmental windows of differential lead-induced immunotoxicity in chickens

Developmental, neuro and immunotoxic effects of perinatal diazepam treatment in rats

Developments of immunotoxicology methods in the rat and applications to the study of environmental pollutants

Dextran sulfate sodium-induced colitis occurs in severe combined immunodeficient mice

Di-(2-ethylhexyl) phthalate adjuvantly induces imbalanced humoral immunity in ovalbumin-sensitized BALB/c mice ascribing to T follicular helper cells hyperfunction

Di(2-ethylhexyl) phthalate inhibits B cell proliferation and reduces the abundance of IgM-secreting cells in cultured immune tissues of the rainbow trout

Diagnosis and treatment of heparin-induced thrombocytopenia (HIT) based on its atypical immunological features

Diagnosis and Treatment of Ventilator-Associated Infection: Review of the Critical Illness Stress-Induced Immune Suppression Prevention Trial Data

Diagnostic accuracy of IgG-specific versus polyspecific enzyme-linked immunoassays in heparin-induced thrombocytopenia: a systematic review and meta-analysis

Diagnostic accuracy of rapid immunoassays for heparin-induced thrombocytopenia. A systematic review and meta-analysis

Diagnostic Performance of a New Rapid Lateral Flow Immunoassay in Patients Suspected of Heparin-Induced Thrombocytopenia and Its Clinical Consequences

Diagnostic value of immunoassays for heparin-induced thrombocytopenia: a systematic review and meta-analysis

Diagnostic value of two immunoassays for detecting heparin/PF4 complex antibodies in heparin-induced thrombocytopenia

Diazepam leads to enhanced severity of orthopoxvirus infection and immune suppression

Diazinon immunotoxicity in mice: modulation of cytokines level and their gene expression

Dibenzo[def,p]chrysene (DBC) suppresses antibody formation in spleen cells following oral exposures of mice

Dibromoacetic acid induced Cl.Ly1+2/-9 T-cell apoptosis and activation of MAPKs signaling cascades

Dibromoacetic Acid Induces Thymocyte Apoptosis by Blocking Cell Cycle Progression, Increasing Intracellular Calcium, and the Fas/FasL Pathway in Vitro

Dibutyl phthalate-mediated oxidative stress induces splenic injury in mice and the attenuating effects of vitamin E and curcumin

Dibutyltin and tributyltin compounds induce thymus atrophy in rats due to a selective action on thymic lymphoblasts

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Dichloroacetate improves immune dysfunction caused by tumor-secreted lactic acid and increases antitumor immunoreactivity

Dicyclohexylphthalate causes hyperactivity in the rat concomitantly with impairment of tyrosine hydroxylase immunoreactivity

Dietary biotin deficiency decreased growth performance and impaired the immune function of the head kidney, spleen and skin in on-growing grass carp (*Ctenopharyngodon idella*)

Dietary *Chlorella vulgaris* Ameliorates Altered Immunomodulatory Functions in Cyclophosphamide-Induced Immunosuppressive Mice

Dietary chromium methionine supplementation could alleviate immunosuppressive effects of heat stress in broiler chicks

Dietary eicosapentaenoic acid prevents systemic immunosuppression in mice induced by UVB radiation

Dietary exposure to low pesticide doses causes long-term immunosuppression in the leopard frog (*Rana pipiens*)

Dietary fish oil suppresses experimental immunoglobulin a nephropathy in mice

Dietary grape-seed proanthocyanidin inhibition of ultraviolet B-induced immune suppression is associated with induction of IL-12

Dietary iron deficiency impaired intestinal immune function of on-growing grass carp under the infection of *Aeromonas hydrophila*: Regulation of NF-kappaB and TOR signaling

Dietary Iron Deficiency Impaired Peripheral Immunity but Did Not Alter Brain Microglia in PRRSV-Infected Neonatal Piglets

Dietary L-carnitine and vitamin-E; a strategy to combat ochratoxin-A induced immunosuppression

Dietary low or excess levels of lipids reduced growth performance, and impaired immune function and structure of head kidney, spleen and skin in young grass carp (*Ctenopharyngodon idella*) under the infection of *Aeromonas hydrophila*

Dietary lutein reduces ultraviolet radiation-induced inflammation and immunosuppression

Dietary mustard seeds (*Sinapis alba* Linn) suppress 1,2-dimethylhydrazine-induced immuno-imbalance and colonic carcinogenesis in rats

Dietary protein restriction impairs growth, immunity, and disease resistance in southern leopard frog tadpoles

Dietary pyridoxine deficiency reduced growth performance and impaired intestinal immune function associated with TOR and NF-kappaB signalling of young grass carp (*Ctenopharyngodon idella*)

Dietary resveratrol supplementation inhibits heat stress-induced high-activated innate immunity and inflammatory response in spleen of yellow-feather broilers

Dietary selenium protect against redox-mediated immune suppression induced by methylmercury exposure

Dietary selenium supplementation alleviates immune toxicity in the hearts of chickens with lead-added drinking water

Dietary zinc deficiency impairs humoral and cellular immune responses to BCG and ESAT-6/CFP-10 vaccination in offspring and adult rats

Differences in patient and transplant professional perceptions of immunosuppression-induced cosmetic side effects

Differences in the incidence and clinical evolution of early neurotoxicity after liver transplantation based on tacrolimus formulation used in the immunosuppressive induction protocol

Differential changes in rat cholinergic parameters subsequent to immunotoxic lesion of the basal forebrain nuclei

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Differential immunogenic and neurogenic inflammatory responses in an allergic mouse model exposed to low levels of formaldehyde

Differential immunotoxic effects of ethanol on murine EL-4 lymphoma and normal lymphocytes is mediated through increased ROS production and activation of p38MAPK

Differential immunotoxic effects of inorganic and organic mercury species in vitro

Differential immunotoxic effects of the environmental chemical benzo[a]pyrene in young and aged mice

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Differential immunotoxicity induced by two different windows of developmental trichloroethylene exposure

Differential immunotoxicity of histone deacetylase inhibitors on malignant and naive hepatocytes

Differential induction of rat neuronal excitotoxic cell death by human immunodeficiency virus type 1 clade B and C tat proteins

Differential inhibition of IL-1 alpha and TNF-alpha generation by ammonium metavanadate in murine macrophages

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Differential protease, innate immunity, and NF-kappaB induction profiles during lung inflammation induced by subchronic cigarette smoke exposure in mice

Differential protection by two sunscreens from UV radiation-induced immunosuppression

Differential role of serotonin projections from the dorsal and median raphe nuclei in phencyclidine-induced hyperlocomotion and fos-like immunoreactivity in rats

Differential sensitivities of bone marrow, spleen and thymus to genotoxicity induced by environmentally relevant concentrations of arsenite

Differential sensitivity to cadmium of immunomarkers measured in hemocyte subpopulations of zebra mussel *Dreissena polymorpha*

Differential, histochemical and immunohistochemical changes in rat hepatocytes after isoflurane or sevoflurane exposure

Digoxin immune fab protects endothelial cells from ouabain-induced barrier injury

Dim light at night interferes with the development of the short-day phenotype and impairs cell-mediated immunity in Siberian hamsters (*Phodopus sungorus*)

Diminished expression of CYP1A1 in urethane-induced lung tumors in strain A/J mice: analysis by in situ hybridization and immunohistochemical methods

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Diminished protection? Early childhood PCB exposure and reduced immune response to vaccinations

Dioxin strongly immunotoxic

Dioxin toxicity, aryl hydrocarbon receptor signaling, and apoptosis-persistent pollutants affect programmed cell death

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Diphenyl diselenide dietary supplementation protects against methylmercury-chloride-induced immunotoxicity in the head kidney and spleen of grass carp (*Ctenopharyngodon idella*) via regulation of purinergic signaling and the NLRP3 inflammasome

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Disaster: stress, immunologic function, and health behavior

Disorders in the murine chromosome apparatus induced by immunization with a complex of antiviral vaccines

Disorders of humoral immunity in workers exposed to organic solvents

Disruption of gut immune system caused by damage of intestinal stem cells and their niche in graft-versus-host disease after allogeneic hematopoietic stem cell transplantation

Disruption of human plasma cell differentiation by an environmental polycyclic aromatic hydrocarbon: a mechanistic immunotoxicological study

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Disseminated superficial porokeratosis secondary to immunosuppression induced by etanercept for extensive psoriasis

Distribution and behavior of the Ah receptor in murine T lymphocytes

Distribution and immunotoxicity by intravenous injection of iron nanoparticles in a murine model

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Docosahexaenoic acid attenuates mycotoxin-induced immunoglobulin a nephropathy, interleukin-6 transcription, and mitogen-activated protein kinase phosphorylation in mice

Does allergen-specific immunotherapy induce contact allergy to aluminium

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Does negative heparin-platelet factor 4 enzyme-linked immunosorbent assay effectively exclude heparin-induced thrombocytopenia

DON shares a similar mode of action as the ribotoxic stress inducer anisomycin while TBTO shares ER stress patterns with the ER stress inducer thapsigargin based on comparative gene expression profiling in Jurkat T cells

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D-penicillamine: mechanism of cellular action and induced autoimmune diseases

D-penicillamine-induced pancreatic islet autoantibody production is independent of the immunogenetic background: a lesson from patients with Wilson's disease

Drinking water disinfection byproducts: review and approach to toxicity evaluation

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Drug induced aseptic meningitis caused by intravenous immunoglobulin therapy

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Drug-induced cutaneous lupus erythematosus after immunoglobulin treatment in chronic inflammatory demyelinating polyneuropathy: a case series

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Drug-induced immune thrombocytopenia: a descriptive survey in the French Pharmacovigilance database

Drug-induced immunotoxicity

Drug-induced linear immunoglobulin A bullous dermatosis mimicking Stevens-Johnson syndrome: a case report

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Early experience with FK 506 induction immunosuppression--suggestion for using oral FK 506

Early exposure to thirdhand cigarette smoke affects body mass and the development of immunity in mice

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Early innate immune events induced by prolonged cold ischemia exacerbate allograft vasculopathy

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Early lifestage exposure and potential developmental susceptibility to tetrachloroethylene

Early onset of immunological heparin-induced thrombocytopenia in acute myocardial infarction

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Early suppression of B cell immune responses by low doses of chloroquine and pyrimethamine: implications for studying immunity in malaria

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Electromagnetic fields may act via calcineurin inhibition to suppress immunity, thereby increasing risk for opportunistic infection: Conceivable mechanisms of action

Electromagnetic fields may act via calcineurin inhibition to suppress immunity, thereby increasing risk for opportunistic infection: Conceivable mechanisms of action.

Elemental diet-induced bacterial translocation associated with systemic and intestinal immune suppression

Elemental diet-induced immune suppression is caused by both bacterial and dietary factors

Elemental imbalance elicited by arsenic and copper exposures leads to oxidative stress and immunotoxicity in chicken gizzard, activating the protective effects of heat shock proteins

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Embryonic exposure to butachlor in zebrafish (*Danio rerio*): endocrine disruption, developmental toxicity and immunotoxicity

Embryonic exposure to cadmium (II) and chromium (VI) induce behavioral alterations, oxidative stress and immunotoxicity in zebrafish (*Danio rerio*)

Embryonic exposure to carbendazim induces the transcription of genes related to apoptosis, immunotoxicity and endocrine disruption in zebrafish (*Danio rerio*)

Embryonic exposure to cis-bifenthrin enantioselectively induces the transcription of genes related to oxidative stress, apoptosis and immunotoxicity in zebrafish (*Danio rerio*)

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Embryonic exposure to PFOS induces immunosuppression in the fish larvae of marine medaka

Embryotoxicity Caused by DON-Induced Oxidative Stress Mediated by Nrf2/HO-1 Pathway

Emerging Role of Immunosuppression in Diseases Induced by Micro- and Nano-Particles: Time to Revisit the Exclusive Inflammatory Scenario

Enantioselective developmental toxicity and immunotoxicity of pyraclofos toward zebrafish (*Danio rerio*)

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Extension of the protocol of OECD guideline 407 (28-day repeated dose oral toxicity test in the rat) to detect potential immunotoxicity of chemicals

Extensive metastatic Kaposi sarcoma in chronic immune suppressed bronchial asthma

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Fatal ceftriaxone-induced hemolysis in a child with acquired immunodeficiency syndrome

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Favorable outcome of severe, extensive, granulocyte colony-stimulating factor-induced, corticosteroid-resistant Sweet's syndrome treated with high-dose intravenous immunoglobulin

Fc receptor binding of anti-CD3 monoclonal antibodies is not essential for immunosuppression, but triggers cytokine-related side effects

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Features of immune response in chronic exposure to industrial aerosols

Feraheme suppresses immune function of human T lymphocytes through mitochondrial damage and mitoROS production

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Fermented Red Ginseng Alleviates Cyclophosphamide-Induced Immunosuppression and 2,4,6-Trinitrobenzenesulfonic Acid-Induced Colitis in Mice by Regulating Macrophage Activation and T Cell Differentiation

Fetal and maternal immune responses to methylmercury exposure: a cross-sectional study

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Fine Particulate Matter-Induced Exacerbation of Allergic Asthma via Activation of T-cell Immunoglobulin and Mucin Domain 1

First report of a B cell lymphoproliferative disorder arising in a patient treated with immune suppressants for severe aplastic anemia

First studies on the bioconcentration and immunotoxicity of tetrachlorodiarlymethanes in the rat

Fish oil infusion reverses 5-fluorouracil-induced impairments in mucosal immunity in mice

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Flow cytometric analysis of in vitro cytotoxicity of cadmium in haemocytes from the tiger shrimp, *Penaeus monodon*

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Fluconazole induces genotoxicity in cultured human peripheral blood mononuclear cells via immunomodulation of TNF- α , IL-6, and IL-10: new challenges for safe therapeutic regimens

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Fluoxetine suppresses the immune responses of blood clams by reducing haemocyte viability, disturbing signal transduction and imposing physiological stress

Focused Screening Identifies Evoxine as a Small Molecule That Counteracts CO₂-Induced Immune Suppression

Follow-up and immunologic findings in drug-induced myasthenia

Fondaparinux cross-reactivity in heparin-induced thrombocytopenia successfully treated with high-dose intravenous immunoglobulin and rivaroxaban

Food Protein Induced Proctocolitis: A Benign Condition with an Obscure Immunologic Mechanism

Food safety

Food-grade TiO₂ impairs intestinal and systemic immune homeostasis, initiates preneoplastic lesions and promotes aberrant crypt development in the rat colon

For Better or Worse, Iron Overload by Superparamagnetic Iron Oxide Nanoparticles as a MRI Contrast Agent for Chronic Liver Diseases

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Fraction From *Lycium barbarum* Polysaccharides Reduces Immunotoxicity and Enhances Antitumor Activity of Doxorubicin in Mice

Francisella tularensis Catalase Restricts Immune Function by Impairing TRPM2 Channel Activity

From immunotoxicity to carcinogenicity: the effects of carbamate pesticides on the immune system

From immunotoxicity to nanotherapy: the effects of nanomaterials on the immune system

FTY720 immunosuppression impairs effector T cell peripheral homing without affecting induction, expansion, and memory

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Gliotoxin Suppresses Macrophage Immune Function by Subverting Phosphatidylinositol 3,4,5-Trisphosphate Homeostasis

Glivec induced autoimmune hepatitis

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Rafinesque, 1820

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Immune/Inflammatory Response and Hypocontractility of Rabbit Colonic Smooth Muscle After TNBS-Induced Colitis

Immune-associated toxicities induced by in vivo and in vitro exposure to interferon-alpha alone or in combination with nucleoside analogs

Immune-enhancing activity of *C. militaris* fermented with *Pediococcus pentosaceus* (GRC-ON89A) in CY-induced immunosuppressed model

Immune-mediated liver dysfunction after antiviral treatment in liver transplanted patients with hepatitis C: allo or autoimmune de novo hepatitis

Immune-mediated myopathy related to anti 3-hydroxy-3-methylglutaryl-coenzymeA reductase antibodies as an emerging cause of necrotizing myopathy induced by statins

Immune-mediated pancytopenia induced by oxaliplatin: a case report

Immune-mediated processes implicated in chemotherapy-induced peripheral neuropathy

Immune-protective, antioxidant and relative genes expression impacts of beta-glucan against fipronil toxicity in Nile tilapia, *Oreochromis niloticus*

Immune-regulatory transcriptional responses in multiple organs of Atlantic salmon after tributyltin exposure, alone or in combination with forskolin

Immune-related Colitis Induced by the Long-term Use of Nivolumab in a Patient with Non-small Cell Lung Cancer

Immune-related eosinophilia induced by anti-programmed death 1 or death-ligand 1 antibodies

Immune-suppressive activity of punicalagin via inhibition of NFAT activation

Immune-suppressive effect of thalidomide

Immunity induced by immunomodulators during echinococcal immunosuppression

Immunity to Polyomavirus BK Infection: Immune Monitoring to Regulate the Balance between Risk of BKV Nephropathy and Induction of Alloimmunity

Immunization of mice with LRP4 induces myasthenia similar to MuSK-associated myasthenia gravis

Immunization with *Porphyromonas gingivalis* enolase induces autoimmunity to mammalian alpha-enolase and arthritis in DR4-IE-transgenic mice

Immunization with the glutamate receptor-derived peptide GluR3B induces neuronal death and reactive gliosis, but confers partial protection from pentylentetrazole-induced seizures

Immuno- and neurotoxicological investigation of combined subacute exposure with the carbamate pesticide propoxur and cadmium in rats

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Immunochemical evidence supporting 2-pentylpyrrole formation on proteins exposed to 4-hydroxy-2-nonenal

Immunochemical methods of studying the mechanism of diclofenac-induced hepatitis

Immunochemical methods of studying the mechanism of diclofenac-induced hepatitis [corrected

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Immunocompetence over the lifespan of mice exposed in utero to carbofuran or diazinon: I. Changes in serum immunoglobulin concentrations

IMMUNOCYTOCHEMICAL ANALYSIS OF THE DISTURBANCES IN THE STRUCTURE OF SYNAPTONEMAL COMPLEXES IN SPERMATOCYTE NUCLEI IN MICE UNDER EXPOSURE TO ROCKET FUEL COMPONENT

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Immunotoxic Potential of Bisphenol F Mediated through Lipid Signaling Pathways on Macrophages

Immunotoxic potential of N-ethyl, N-nitrosourea (ENU) in CD1 mice

Immunotoxic response of oleic acid anilide and its hydrolysis products in female MRL (+/+) mice

Immunotoxic responses of chronic exposure to cypermethrin in common carp

Immunotoxic responses of cypermethrin, a synthetic pyrethroid insecticide in rats

Immunotoxicities of microplastics and sertraline, alone and in combination, to a bivalve species: size-dependent interaction and potential toxication mechanism

Immunotoxicity activity from the essential oils of coriander (*Coriandrum sativum*) seeds

Immunotoxicity activity of natural furocoumarins from milky sap of *Ficus carica* L. against *Aedes aegypti* L

Immunotoxicity and allergenic potential induced by topical application of perfluorooctanoic acid (PFOA) in a murine model

Immunotoxicity and allergic potential induced by topical application of dimethyl carbonate (DMC) in a murine model

Immunotoxicity and biodistribution analysis of arsenic trioxide in C57Bl/6 mice following a 2-week inhalation exposure

Immunotoxicity and disease resistance in Japanese quail (*Coturnix coturnix japonica*) exposed to malathion

Immunotoxicity and environment: immunodysregulation and systemic inflammation in children

Immunotoxicity and genotoxicity of single-walled carbon nanotubes co-exposed with cadmium in the freshwater mussel, *Elliptio complanata*

Immunotoxicity and genotoxicity testing of PLGA-PEO nanoparticles in human blood cell model

Immunotoxicity and hematotoxicity induced by tetrachloroethylene in egyptian dry cleaning workers

Immunotoxicity and hepatic function evaluation in Nile tilapia (*Oreochromis niloticus*) exposed to diazinon

Immunotoxicity and oxidative stress in the Arctic scallop *Chlamys islandica*: effects of acute oil exposure

Immunotoxicity and pulmonary toxicity induced by paints in Egyptian painters

Immunotoxicity and sensitizing capacity of metal compounds depend on speciation

Immunotoxicity and transcriptome analysis of zebrafish embryos in response to glufosinate-ammonium exposure

Immunotoxicity assessment of CdSe/ZnS quantum dots in macrophages, lymphocytes and BALB/c mice

Immunotoxicity assessment of gentamycin and liquamycin

Immunotoxicity assessment of rice-derived recombinant human serum albumin using human peripheral blood mononuclear cells

Immunotoxicity assessment of sub-chronic oral administration of acetamiprid in Wistar rats

Immunotoxicity Considerations for Next Generation Cancer Nanomedicines

Immunotoxicity derived from manipulating leukocytes with lipid-based nanoparticles

Immunotoxicity effects of carbaryl in vivo and in vitro

Immunotoxicity evaluation by subchronic oral administration of clothianidin in Sprague-Dawley rats

Immunotoxicity evaluation of novel bioactive composites in male mice as promising orthopaedic implants

Immunotoxicity Following Pre- and Post-natal Aluminum Exposure in Rats

Immunotoxicity from checkpoint inhibitor therapy: clinical features and underlying mechanisms

Immunotoxicity in ascidians: antifouling compounds alternative to organotin-IV. The case of zinc pyrithione

Immunotoxicity in ascidians: antifouling compounds alternative to organotins: III--the case of copper(I) and Irgarol 1051

Immunotoxicity in ascidians: antifouling compounds alternative to organotins - II. The case of Diuron and TCMS pyridine

Immunotoxicity in C57BL/6 mice exposed to benzene and Aroclor 1254

Immunotoxicity in channel catfish, *Ictalurus punctatus*, following acute exposure to tributyltin

Immunotoxicity in green mussels under perfluoroalkyl substance (PFAS) exposure: Reversible response and response model development

Immunotoxicity in invertebrates: measurement and ecotoxicological relevance

Immunotoxicity in mice induced by short-term exposure to methoxychlor, parathion, or piperonyl butoxide

Immunotoxicity induced by acute subtoxic doses of paraquat herbicide: implication of shifting cytokine gene expression toward T-helper (T(H))-17 phenotype

Immunotoxicity induced in mice by subacute exposure to berberine

Immunotoxicity monitoring of hospital staff occupationally exposed to cytostatic drugs

Immunotoxicity of 180 day exposure to polydimethylsiloxane (silicone) fluid, gel and elastomer and polyurethane disks in female B6C3F1 mice

Immunotoxicity of 1-methyl-3-octylimidazolium bromide on brocarded carp (*Cyprinus carpio* L

Immunotoxicity of 2',3'-dideoxyinosine in female B6C3F1 mice

Immunotoxicity of 2,4-diaminotoluene in female B6C3F1 mice

Immunotoxicity of 2-methoxyethanol following oral administration in Fischer 344 rats

Immunotoxicity of 3 chemical forms of beryllium following inhalation exposure

Immunotoxicity of a reconstituted polynuclear aromatic hydrocarbon mixture in B6C3F1 mice

Immunotoxicity of a standardized citrus polymethoxylated flavone extract

Immunotoxicity of acrylamide in female BALB/c mice

Immunotoxicity of acute acephate exposure in control or IL-1-challenged rats: correlation between the immune cell composition and corticosteroid concentration in blood

Immunotoxicity of aflatoxin B1 in rats: effects on lymphocytes and the inflammatory response in a chronic intermittent dosing study

Immunotoxicity of aflatoxin B1: impairment of the cell-mediated response to vaccine antigen and modulation of cytokine expression

Immunotoxicity of aflatoxin M1 : as a potent suppressor of innate and acquired immune systems in a subacute study

Immunotoxicity of alcohol in young and old mice. I. In vitro suppressive effects of ethanol on the activities of T and B immune cells of aging mice

Immunotoxicity of alcohol in young and old mice. II. Impaired T cell proliferation and T cell-dependent antibody responses of young and old mice fed ethanol-containing liquid diet

Immunotoxicity of aluminum

Immunotoxicity of aluminum chloride

Immunotoxicity of aminocarb. III. Exposure route-dependent immunomodulation by aminocarb in mice

Immunotoxicity of atrazine in Balb/c mice

Immunotoxicity of AZT: inhibitory effect on thymocyte differentiation and peripheral T cell responsiveness to gp120 of human immunodeficiency virus

Immunotoxicity of benzodiazepines. Influence on contact hypersensitivity to picryl chloride in mice

Immunotoxicity of Benzothiazole on *Mytilus Edulis* Following In Vitro Exposure of Hemocytes

Immunotoxicity of beryllium

Immunotoxicity of beta-Diketone Antibiotic Mixtures to Zebrafish (*Danio rerio*) by Transcriptome Analysis

Immunotoxicity of bis(tri-n-butyltin) oxide in the rat

Immunotoxicity of bis(tri-n-butyltin)oxide in the rat: effects on thymus-dependent immunity and on nonspecific resistance following long-term exposure in young versus aged rats

Immunotoxicity of bisphenol A to *Carassius auratus* lymphocytes and macrophages following in vitro exposure

Immunotoxicity of bisphenol S and F are similar to that of bisphenol A during zebrafish early development

Immunotoxicity of carbaryl in chicken

Immunotoxicity of carbon black nanoparticles to blue mussel hemocytes

Immunotoxicity of clonazepam in adult albino rats

Immunotoxicity of cobalt and nickel--experimental study on cytotoxicity of immuno-sensitive metals

Immunotoxicity of cocaethylene

Immunotoxicity of cocaine and crack

Immunotoxicity of commercial-mixed glyphosate in broad snouted caiman (*Caiman latirostris*)

Immunotoxicity of copper alginate fibers in guinea pigs and mice

- Immunotoxicity of copper nanoparticle and copper sulfate in a common Indian earthworm
- Immunotoxicity of cupravit and previcur fungicides in mice
- Immunotoxicity of environmentally relevant concentrations of butyltins on human natural killer cells in vitro
- Immunotoxicity of epicutaneously applied anticoagulant rodenticide warfarin: evaluation by contact hypersensitivity to DNCB in rats
- Immunotoxicity of estrogen and nonylphenol on apoptosis and expression of ERs in goldfish macrophage: Opening new avenue for discovering the role of experimental model systems and sexes
- Immunotoxicity of ethyl carbamate in female BALB/c mice: role of esterase and cytochrome P450
- Immunotoxicity of ethyl-4-isothiocyanatobutanoate in male Wistar rats
- Immunotoxicity of explosives-contaminated soil before and after bioremediation
- Immunotoxicity of four nanoparticles to a marine bivalve species, *Tegillarca granosa*
- Immunotoxicity of gallium arsenide on antigen presentation: comparative study of intratracheal and intraperitoneal exposure routes
- Immunotoxicity of heavy metals in relation to Great Lakes
- Immunotoxicity of hexachlorobenzene
- Immunotoxicity of hydrocortisone on Th1/Th2-related cytokine production is associated with yang-deficient state in traditional Chinese medicine
- Immunotoxicity of in vitro vanadium exposures: effects on interleukin-1, tumor necrosis factor-alpha, and prostaglandin E2 production by WEHI-3 macrophages
- Immunotoxicity of low level cadmium exposure in fish: an alternative animal model for immunotoxicological studies
- Immunotoxicity of mercury: Pathological and toxicological effects
- Immunotoxicity of microplastics and two persistent organic pollutants alone or in combination to a bivalve species
- Immunotoxicity of monoclonal antibodies
- Immunotoxicity of mono-nitrotoluenes in female B6C3F1 mice: I. Para-nitrotoluene
- Immunotoxicity of mono-nitrotoluenes in female B6C3F1 mice: II. Meta-nitrotoluene
- Immunotoxicity of mycotoxins
- Immunotoxicity of N,N-diethylaniline in mice: effect on natural killer activity, cytotoxic T lymphocyte activity, lymphocyte proliferation response and cellular components of the spleen
- Immunotoxicity of nanoparticle nTiO2 to a commercial marine bivalve species, *Tegillarca granosa*

Immunotoxicity of nanoparticles

Immunotoxicity of nanoparticles: a computational study suggests that CNTs and C60 fullerenes might be recognized as pathogens by Toll-like receptors

Immunotoxicity of nitrobenzene in female B6C3F1 mice

Immunotoxicity of nivalenol after subchronic dietary exposure to rats

Immunotoxicity of nucleic acid reduced BioProtein--a bacterial derived single cell protein--in Wistar rats

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Immunotoxicity of ochratoxin A to growing gilts

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Immunotoxicity of organophosphorous pesticides

Immunotoxicity of paraquat after subacute exposure to mice

Immunotoxicity of particulate lead: in vitro exposure alters pulmonary macrophage tumor necrosis factor production and activity

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Immunotoxicity of pentachlorophenol (PCP): increased susceptibility to tumor growth in adult mice fed technical PCP-contaminated diets

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Immunotoxicity of perfluorinated alkylates: calculation of benchmark doses based on serum concentrations in children

Immunotoxicity of perfluorinated compounds: recent developments

Immunotoxicity of perfluorooctanoic acid and perfluorooctane sulfonate and the role of peroxisome proliferator-activated receptor alpha

Immunotoxicity of pesticides

Immunotoxicity of pesticides: perspectives and trends

Immunotoxicity of phosphamidon following subchronic exposure in albino rats

Immunotoxicity of poly (lactic-co-glycolic acid) nanoparticles: influence of surface properties on dendritic cell activation

Immunotoxicity of polychlorinated biphenyls (PCB) in free-ranging gray seal pups with special emphasis on dioxin-like congeners

Immunotoxicity of polychlorinated biphenyls: present status and future considerations

Immunotoxicity of polyunsaturated fatty acids in serum-free medium

Immunotoxicity of pyrethroid metabolites in an in vitro model

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Immunotoxicity of silicon dioxide nanoparticles with different sizes and electrostatic charge

Immunotoxicity of silicone: implications of oxidant balance towards adjuvant activity

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Immunotoxicity of silver nanoparticles in an intravenous 28-day repeated-dose toxicity study in rats

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Immunotoxicity of subchronic versus chronic exposure to aldicarb in mice

Immunotoxicity of sulfuric acid aerosol: effects on pulmonary macrophage effector and functional activities critical for maintaining host resistance against infectious diseases

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Immunotoxicity of tannery effluent to the freshwater fish *Cyprinus carpio*

Immunotoxicity of the anticancer drug CI-994 in rats: effects on lymphoid tissue

Immunotoxicity of the colour additive caramel colour III; a review on complicated issues in the safety evaluation of a food additive

Immunotoxicity of the commercial polybrominated diphenyl ether mixture DE-71 in ranch mink (*Mustela vison*)

Immunotoxicity of the organochlorine pesticide methoxychlor in female ICR, BALB/c, and C3H/He mice

Immunotoxicity of the pyrethroid insecticides deltamethrin and alpha-cypermethrin

Immunotoxicity of the pyrrolizidine alkaloid monocrotaline following subchronic administration to C57Bl/6 mice

Immunotoxicity of the semiconductor gallium arsenide in female B6C3F1 mice

Immunotoxicity of the xenoestrogen 4-nonylphenol to the cockle *Cerastoderma glaucum*

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Immunotoxicity of trenbolone acetate in Japanese quail

Immunotoxicity of tributyltin oxide in rats exposed as adults or pre-weanlings

Immunotoxicity of trichloroethylene: a study with MRL-lpr/lpr mice

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Immunotoxicity of washing soda in a freshwater sponge of India

Immunotoxicity of zearalenone in Balb/c mice in a high subchronic dosing study counteracted by *Raphanus sativus* extract

Immunotoxicity of zinc oxide nanoparticles with different size and electrostatic charge

Immunotoxicity risks associated with land-treatment of petrochemical wastes revealed using an in situ rodent model

Immunotoxicity studies in mink (*Mustela vison*) chronically exposed to dietary bleached kraft pulp mill effluent

Immunotoxicity studies of PCB (Aroclor 1254) in the adult rhesus (*Macaca mulatta*) monkey--preliminary report

Immunotoxicity study of repeated small doses of dimethoate and methylparathion administered to rats over three generations

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Immunotoxicity, genotoxicity and epigenetic toxicity of nanomaterials: New strategies for toxicity testing

Immunotoxicity: the risk is real

Immunotoxicologic effects of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) in rabbits

Immunotoxicologic effects of cyclosporine on tumor progression in models of squamous cell carcinoma and B-cell lymphoma in C3H mice

Immunotoxicologic effects of ethylene dibromide in the mouse and their modulation by the estrous cycle

Immunotoxicologic effects of inhaled chromium: role of particle solubility and co-exposure to ozone

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Immunotoxicological and biochemical effects of aflatoxins in rats prevented by Tunisian montmorillonite with reference to HSCAS

Immunotoxicological and neurotoxicological profile of health effects following subacute exposure to geogenic dust from sand dunes at the Nellis Dunes Recreation Area, Las Vegas, NV

Immunotoxicological assessment of cyclosporin A by conventional pathological techniques and immune function testing in the rat

Immunotoxicological characteristics of sodium methyldithiocarbamate

Immunotoxicological consequences of perinatal chemical exposures

Immunotoxicological consequences of perinatal chemical exposures: a plea for inclusion of immune parameters in reproduction studies

Immunotoxicological effects of a sub-chronic exposure to selected current-use pesticides in rainbow trout (*Oncorhynchus mykiss*)

Immunotoxicological effects of Agent Orange exposure to the Vietnam War Korean veterans

Immunotoxicological effects of an activated-sludge-treated effluent on rainbow trout (*Oncorhynchus mykiss*)

Immunotoxicological Effects of Aripiprazole: In vivo and In vitro Studies

Immunotoxicological effects of arsenic bioaccumulation on spatial metallomics and cellular enzyme response in the spleen of male Wistar rats after oral intake

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Immunotoxicological effects of environmental contaminants on marine bivalves

Immunotoxicological effects of inorganic arsenic on gilthead seabream (*Sparus aurata* L)

Immunotoxicological effects of JP-8 jet fuel exposure

Immunotoxicological effects of piperine in mice

Immunotoxicological effects of repeated combined exposure by cypermethrin and the heavy metals lead and cadmium in rats

Immunotoxicological effects of streptozotocin and alloxan: in vitro and in vivo studies

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Immunotoxicological evaluation of toluene exposure via drinking water in mice

Immunotoxicological examination of repeated dose combined exposure by dimethoate and two heavy metals in rats

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Immunotoxicological impact of engineered nanomaterial exposure: mechanisms of immune cell modulation

Immunotoxicological impact of occupational and environmental nanoparticles exposure: The influence of physical, chemical, and combined characteristics of the particles

Immunotoxicological investigation in rats dosed repeatedly with combinations of cypermethrin, As(III), and Hg(II)

Immunotoxicological investigation of SCMF, a new pyrethroid pesticide in mice

Immunotoxicological investigation of subacute combined exposure by permethrin and the heavy metals arsenic(III) and mercury(II) in rats

Immunotoxicological investigation of subacute combined exposure with low doses of Pb, Hg and Cd in rats

Immunotoxicological investigation of the effects of a pesticide; cypermethrin

Immunotoxicological investigation using pharmaceutical drugs. In vitro evaluation of immune effects using rodent or human immune cells

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Immunotoxicological response of the earthworm *Lumbricus terrestris* following exposure to cement kiln dusts

Immunotoxicological risk of mycotoxins for domestic animals

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Immunotoxicology and its application in risk assessment

Immunotoxicology assessment in the pharmaceutical industry

Immunotoxicology in occupational and environmental medicine: perspectives, limitations, and research objectives

Immunotoxicology in wood mice along a heavy metal pollution gradient

Immunotoxicology of arc welding fume: worker and experimental animal studies

Immunotoxicology of beryllium lung disease

Immunotoxicology of brown recluse spider (*Loxosceles reclusa*) venom

Immunotoxicology of cadmium

Immunotoxicology of cadmium and mercury on B-lymphocytes--I. Effects on lymphocyte function

Immunotoxicology of cigarette smoke condensates: suppression of macrophage responsiveness to interferon gamma

Immunotoxicology of heavy metals

Immunotoxicology of non-functionalized engineered nanoparticles in aquatic organisms with special emphasis on fish--review of current knowledge, gap identification, and call for further research

Immunotoxicology of organic acid anhydrides (OAAs)

Immunotoxicology of silica

Immunotoxicology studies of sodium arsenate-effects of exposure on tumor growth and cell-mediated tumor immunity

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Immunotoxins constructed with chimeric, short-lived anti-CD22 monoclonal antibodies induce less vascular leak without loss of cytotoxicity

impact of aluminum exposure on the immune system: a mini review

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Impact of dietary *Trichosporon* mycotoxinivorans on ochratoxin A induced immunotoxicity; In vivo study

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Impaired cell-mediated immunity in the first week after burn injury: investigation of spontaneous blastogenic transformation, PHA, IL-2 response and plasma suppressive activity

Impaired cellular immune response to diphtheria and tetanus vaccines in children after thoracic transplantation

Impaired cellular immune response to injected bacteria after knockdown of ferritin genes in the hard tick *Haemaphysalis longicornis*

Impaired Cytomegalovirus Immunity in Idiopathic Pulmonary Fibrosis Lung Transplant Recipients with Short Telomeres

Impaired humoral and cellular immune responses to influenza vaccination in chronic obstructive pulmonary disease patients

Impaired immune defense in hemodialysis patients: role of alpha-defensins

Impaired immune function and structural integrity in the gills of common carp (*Cyprinus carpio* L.) caused by chlorpyrifos exposure: Through oxidative stress and apoptosis

Impaired Immune Function in Patients Undergoing Surgery for Bone Cancer

Impaired immune regulation after radioiodine therapy for Graves' disease and the protective effect of Methimazole

Impaired Immune Response in Elderly Burn Patients: New Insights Into the Immune-senescence Phenotype

Impaired Immune Response in Old Mice Suffering from Obesity and Premature Immunosenescence in Adulthood

Impaired immune response in severe human lower tract respiratory infection by respiratory syncytial virus

Impaired immune response to vaccination against infection with human respiratory syncytial virus at advanced age

Impaired immune responses following spinal cord injury lead to reduced ability to control viral infection

Impaired immune responses in streptozotocin-induced type I diabetes in mice. Involvement of high glucose

Impaired immunity in obesity: suppressed but reversible lymphocyte responsiveness

Impaired immunity: risk groups and consequences for general practice

Impaired immunocompetence associated with iron deficiency

Impaired immunoglobulin M production by incubation of hybridoma cells with ethanol

Impaired immunosuppressive response to ultraviolet radiation in interleukin-10-deficient mice

Impaired innate immune alveolar macrophage response and the predilection for COPD exacerbations

Impaired innate immunity of ocular surface is the key bridge between extended contact lens wearing and occurrence of *Acanthamoeba* keratitis

Impaired innate mucosal immunity in aged mice permits prolonged *Streptococcus pneumoniae* colonization

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Impaired intestinal immunity and barrier function: a cause for enhanced bacterial translocation in alcohol intoxication and burn injury

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Impaired long-term immune protection following pneumococcal 13-valent/23-valent polysaccharide vaccine in systemic lupus erythematosus (SLE)

Impaired Microcirculation in Children After Kidney Transplantation: Everolimus Versus Mycophenolate Based Immunosuppression Regimen

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Impaired responses to gliadin and gut microbes of immune cells from mice with altered stress-related behavior and premature immune senescence

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Impairment of cell-mediated immune responses by *Pseudomonas aeruginosa*

Impairment of Immunonutritional Status During Treatment is a Factor Associated With Oncologic Outcomes in Patients With Rectal Cancer Treated With Preoperative Chemoradiotherapy

Impairment of Immunoproteasome Function by Cigarette Smoke and in Chronic Obstructive Pulmonary Disease

Impairment of innate immune function by hydroxyethyl starch

Impairment of innate immune killing mechanisms by bacteriostatic antibiotics

Impairment of innate immune responses of airway epithelium by infection with bovine viral diarrhea virus

Impairment of non-specific immunity in patients under persistent vegetative state resulting from trauma

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Impairment of several immune functions in anxious women

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Implications of the new FDA/CDER immunotoxicology guidance for drugs

Implications of UV-induced inflammation and immunomodulation

Importance of innate immunity and collagen binding integrin $\alpha 1\beta 1$ in TNBS-induced colitis

In altering the release of glucocorticoids, ketorolac exacerbates the effects of systemic immune stimuli on expression of proinflammatory genes in the brain

In contrast to morphine, buprenorphine enhances macrophage-induced humoral immunity and, as oxycodone, slightly suppresses the effector phase of cell-mediated immune response in mice

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In utero exposure to arsenic alters lung development and genes related to immune and mucociliary function in mice

In Utero exposure to genistein enhanced intranasal house dust mite allergen-induced respiratory sensitization in young adult B6C3F1 mice

In utero exposure to immunosuppressive drugs

In utero exposure to immunosuppressive drugs: experimental and clinical studies

In utero ultrafine particulate matter exposure causes offspring pulmonary immunosuppression

In vitro analysis of verapamil-induced immunosuppression: potent inhibition of T cell motility and lymphocytic transmigration through allogeneic endothelial cells

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In vitro characterization of the immunotoxic potential of several perfluorinated compounds (PFCs)

In vitro cytokine release from human peripheral blood mononuclear cells in the assessment of the immunotoxic potential of chemicals

In vitro cytopathic effects of mycotoxin T-2 on human peripheral blood T lymphocytes

In vitro effect of 4-pentylphenol and 3-methyl-4-nitrophenol on murine splenic lymphocyte populations and cytokine/granzyme production

In vitro enhancement of mouse T helper 2 cell sensitization to ovalbumin allergen by carbon black nanoparticles

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In vitro evaluation of the immunotoxic potential of perfluorinated compounds (PFCs)

In Vitro Exposure of Harbor Seal Immune Cells to Aroclor 1260 Alters Phocine Distemper Virus Replication

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In vitro immunotoxicity of bis(tri-n-butyltin)oxide (TBTO) studied by toxicogenomics

In vitro immunotoxicity of untreated and treated urban wastewaters using various treatment processes to rainbow trout leucocytes

In vitro immunotoxicological effects of heavy metals on European sea bass (*Dicentrarchus labrax* L.) head-kidney leucocytes

In vitro immunotoxicology of quantum dots and comparison with dissolved cadmium and tellurium

In vitro lymphotoxicity and selective T cell immunotoxicity of high doses of acyclovir and its derivatives in mice

In vitro Modulating Activity of aqueous extracts from American Plants on Chlorpyrifos-induced toxicity on Murine Splenocytes

In vitro nanoparticle toxicity to rat alveolar cells and coelomocytes from the earthworm *Lumbricus rubellus*

In vitro nephrotoxicity induced by chloronitrobenzenes in renal cortical slices from Fischer 344 rats

In vitro nephrotoxicity induced by propanil

In vitro potency of inhibition by antiviral drugs of hematopoietic progenitor colony formation correlates with exposure at hemotoxic levels in human immunodeficiency virus-positive humans

In vitro stimulatory effect of N-acetyl tryptophan-glucopyranoside against gamma radiation induced immunosuppression

In vitro studies on immunotoxic potential of Orange II in splenocytes

In vitro study on the immune effects of the exposure to palladium nanoparticles

In vitro tests to evaluate immunotoxicity: a preliminary study

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In vitro VLA-4 blockade results in an impaired NK cell-mediated immune surveillance against melanoma

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In vitro" effects of different arsenic compounds on PBMC (preliminary study)

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In vivo immunotoxicity of SiO₂@(Y_{0.5}Gd_{0.45}Eu_{0.05})₂O₃ as dual-modality nanoprobes

In vivo induction of apoptosis and immune responses in mice by administration of lipopolysaccharide from *Porphyromonas gingivalis*

In vivo short-term exposure to residual oil fly ash impairs pulmonary innate immune response against environmental mycobacterium infection

In vivo studies on the immunotoxic effects of microcystins on rabbit

In Vivo toxicological assessment of biologically synthesized silver nanoparticles in adult Zebrafish (*Danio rerio*)

Inactivation of cadmium induced immunotoxicological alterations in rats by Tunisian montmorillonite clay

Incidence and etiology of hepatic dysfunction in heart transplant recipients receiving a cyclosporine-based triple immunosuppressive therapy

Incidence and natural history of intravenous immunoglobulin-induced aseptic meningitis: a retrospective review at a single tertiary care center

Incidence of cytomegalovirus in cardiac transplant recipients receiving induction immunosuppression with antithymocyte globulin

Incident stressful and traumatic life events and human immunodeficiency virus sexual transmission risk behaviors in a longitudinal, multisite cohort study

Inconsistently impairment of immune function and structural integrity of head kidney and spleen by vitamin A deficiency in grass carp (*Ctenopharyngodon idella*)

Increase in level of tumor necrosis factor- α in 6-hydroxydopamine-lesioned striatum in rats is suppressed by immunosuppressant FK506

Increased affective ultrasonic communication during fear learning in adult male rats exposed to maternal immune activation

Increased expression of immune modulator proteins and decreased expression of apolipoprotein A-1 and haptoglobin in blood plasma of sarin exposed rats

Increased expression of platelet IgG Fc receptors in immune heparin-induced thrombocytopenia

Increased immune and inflammatory responses to dust mite antigen in rats exposed to 5 ppm NO₂

Increased immunoreactive rat lung ICAM-1 in oleic acid-induced lung injury

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Induced sensitization to nickel in guinea pigs immunized with mycobacteria by injection of purified protein derivative with nickel

Inducible headkidney cytochrome P450 contributes to endosulfan immunotoxicity in walking catfish *Clarias gariepinus*

Induction and activation of adaptive immune populations during acute and chronic phases of a murine model of experimental colitis

Induction and Amelioration of Methotrexate-Induced Gastrointestinal Toxicity are Related to Immune Response and Gut Microbiota

Induction and modulation of pulmonary inflammation by organic dusts: cytokines, immune complexes and 'all of those things

Induction Immunosuppression in High-risk Kidney Transplant Recipients

Induction immunosuppression in kidney transplant recipients older than 60 years of age : safety and efficacy of ATGAM, OKT3 and Simulect

Induction immunosuppression with interleukin-2 receptor antibodies (basiliximab and daclizumab) in renal transplant recipients

Induction immunosuppression with OKT3 monoclonal antibody in cardiac transplant recipients

Induction immunosuppressive therapy in kidney transplantation

Induction immunosuppressive therapy in renal transplantation: does basiliximab make the difference

Induction immunosuppressive therapy in the elderly kidney transplant recipient in the United States

Induction immunosuppressive therapy stratified according to risk categories in renal transplantation

Induction of a type 1 immune response to a recombinant antigen from *Mycobacterium tuberculosis* expressed in *Mycobacterium vaccae*

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Induction of an autologous immune-complex glomerulonephritis in the rat by intravenous injection of heterologous anti-rat kidney tubular antibody IV: Effect of injection of HgCl₂ prior to the antibody

Induction of antiviral cytotoxic T cells by plasmacytoid dendritic cells for adoptive immunotherapy of posttransplant diseases

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Induction of autoimmunity through bystander effects. Lessons from immunological disorders induced by heavy metals

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Induction of colitis in mice with food allergen-specific immune response

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Induction of experimental systemic lupus erythematosus in mice by immunization with a monoclonal anti-La autoantibody

Induction of IDO-1 by immunostimulatory DNA limits severity of experimental colitis

Induction of Immune Reaction in Benign Melanocytic Nevi Without Halo During Nivolumab Therapy in a Patient With Melanoma

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Induction of immunotoxicity by polycyclic hydrocarbons: role of the Ah locus

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Induction of Maternal Immune Activation in Mice at Mid-gestation Stage with Viral Mimic Poly(I:C

Induction of multiple melanocytic nevus cell nevi in 2 children with malignant hematologic systemic diseases and chemotherapy-induced immunosuppression

Induction of neutralizing antibodies against Tityus serrulatus toxins by immunization with a recombinant nontoxic protein

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Induction versus noninduction in renal transplant recipients with tacrolimus-based immunosuppression

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Influence of melatonin on immunotoxicity of lead

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Initial experience of combined immunosuppressive induction therapy with polyclonal antithymocyte antibody, FK 506 (tacrolimus), and prednisolone in clinical liver transplantation

Initial immunosuppression in liver transplant recipients with impaired renal function

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Intravenous immunoglobulin as prophylaxis of chemotherapy-induced oral mucositis

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Intravenous immunoglobulin-induced acute thrombocytopenia

Intravenous immunoglobulin-induced haemolysis: a case report and review of the literature

Intravenous immunoglobulin-induced hemolytic anemia after thoracoscopic thymectomy for myasthenia gravis

Intravenous immunoglobulin-induced hemolytic anemia in a patient with juvenile dermatomyositis

Intravenous immunoglobulin-induced lichenoid dermatitis: a unique adverse reaction

Intravenous immunoglobulin-induced neutropenia

Intravenous immunoglobulin-induced neutrophil apoptosis in the lung during murine endotoxemia

Intravenous immunoglobulin-induced osmotic nephrosis

Intravenous Immunoglobulin-Induced Profound Bradycardia in a Patient With Idiopathic Thrombocytopenic Purpura

Intravenous Immunoglobulin-Induced Pulmonary Embolism: It Is Time to Act

Intravenous immunoglobulin-induced reversible neutropenia in a renal transplant patient

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Investigating the Effects of Particulate Matter on House Dust Mite and Ovalbumin Allergic Airway Inflammation in Mice

Investigation of a screening battery for immunotoxicity of pharmaceuticals within a 28-day oral toxicity study using azathioprine and cyclosporin A as model compounds

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Investigation of sensitive biomarkers to determine cadmium inducing hepato- and nephro-toxicity in cattle by immunofluorescence method

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Is Chronic Exposure to Low-Dose Organochlorine Pesticides a New Risk Factor of T-cell Immunosenesence

Is hydroxylamine-induced cytotoxicity a valid marker for hypersensitivity reactions to sulfamethoxazole in human immunodeficiency virus-infected individuals

Is impaired immunity a consequence of surgery in patients infected by the human immunodeficiency virus

Is murine gammaherpesvirus-68 (MHV-68) a suitable immunotoxicological model for examining immunomodulatory drug-associated viral recrudescence

Is opioid-induced immunosuppression a clinically relevant problem? Innocent until proven guilty

Is there a human health risk associated with indirect exposure to perfluoroalkyl carboxylates (PFCAs)

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Is there evidence that environmental noise is immunotoxic

Is type 1 diabetes a disease of the gut immune system triggered by cow's milk insulin

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Isoflavonoid compounds from red clover (*Trifolium pratense*) protect from inflammation and immune suppression induced by UV radiation

Isoflurane anesthesia impairs the expression of immune neuromodulators in the hippocampus of aged mice

Isolated herpes simplex in the adult larynx as a rare complication of methotrexate-induced immunosuppression

Isolation and characterization of microglia from adult mouse brain: selected applications for ex vivo evaluation of immunotoxicological alterations following in vivo xenobiotic exposure

Issues raised by the reference doses for perfluorooctane sulfonate and perfluorooctanoic acid

iTRAQ: a method to elucidate cellular responses to mycotoxin zearalenone

Jeju ground water containing vanadium induced immune activation on splenocytes of low dose gamma-rays-irradiated mice

Jet fuel-induced immunotoxicity

JP-8 induces immune suppression via a reactive oxygen species NF-kappaB-dependent mechanism

JP-8 jet fuel exposure results in immediate immunotoxicity, which is cumulative over time

JP-8 jet fuel exposure suppresses the immune response to viral infections

Kaposi's sarcoma-associated herpesvirus-encoded replication and transcription activator impairs innate immunity via ubiquitin-mediated degradation of myeloid differentiation factor 88

Kawasaki syndrome. Association with exposure to carpet shampoo and successful therapy with immunoglobulins in the second week of the illness

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Ketoprofen impairs immunosuppression induced by severe sepsis and reveals an important role for prostaglandin E2

Keyhole limpet haemocyanin - a model antigen for human immunotoxicological studies

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Kidney disorders induced by non-steroidal anti-inflammatory agents and immunomodulators

Kinetic determination of vitellogenin induction in the epidermis of cyprinid and perciform fishes: Evaluation of sensitive enzyme-linked immunosorbent assays

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Laboratory diagnosis of heparin-induced thrombocytopenia in Asian Indians as investigated with functional and immunologic methods

Laboratory diagnosis of immune heparin-induced thrombocytopenia

Lack of autoantibody induction by mercury exposure in artisanal gold mining settings in Colombia: Findings and a review of the epidemiology literature

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Lactobacillus plantarum KLDS1.0318 Ameliorates Impaired Intestinal Immunity and Metabolic Disorders in Cyclophosphamide-Treated Mice

Lactobacillus plantarum NCU116 Attenuates Cyclophosphamide-Induced Immunosuppression and Regulates Th17/Treg Cell Immune Responses in Mice

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Lamotrigine-induced common variable immune deficiency

Lamotrigine-induced toxic epidermal necrolysis treated with intravenous cyclosporin: a discussion of pathogenesis and immunosuppressive management

L-arginine and L-glutamine as immunonutrients and modulating agents for oxidative stress and toxicity induced by sodium nitrite in rats

L-Arginine reverses radiation-induced immune dysfunction: the need for optimum treatment window

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Late conversion from tacrolimus to a belatacept-based immuno-suppression regime in kidney transplant recipients improves renal function, acid-base derangement and mineral-bone metabolism

Late onset neutropenia and immunoglobulin suppression of the patients with malignant lymphoma following autologous stem cell transplantation with rituximab

Late-onset pericardial tamponade, bilateral pleural effusions and recurrent immune monoarthritis induced by ipilimumab use for metastatic melanoma

Lead alters the immunogenicity of two neural proteins: a potential mechanism for the progression of lead-induced neurotoxicity

Lead and immune function

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Lead toxicity: from overt to subclinical to subtle health effects

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Letter: Tinea faciei exacerbated by topical immunomodulation: Two case reports

Leukopenia and altered hematopoietic activity in mice exposed to the abused inhalant, isobutyl nitrite

Levels of serum oxidoreductases (LD, MD, ICD), blood proteins, immunoglobulins, and ceruloplasmin in a group of workers exposed to carbon disulfide

Levocarnitine administration in multiple sclerosis patients with immunosuppressive therapy-induced fatigue

Lichen planus and lichenoid drug-induced eruption: a histological and immunohistochemical study

Life events, frontal electroencephalogram laterality, and functional immune status after acute psychological stressors in adolescents

Life stress and cervical squamous intraepithelial lesions in women with human papillomavirus and human immunodeficiency virus

Lifelong persistent viral infection alters the naive T cell pool, impairing CD8 T cell immunity in late life

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Life-threatening piperacillin-induced immune haemolysis in a patient with cystic fibrosis

Life-threatening rituximab-induced pyoderma gangrenosum successfully treated with intravenous immunoglobulin

Life-threatening ceftriaxone-induced immune hemolytic anemia in a child with Crohn's disease

Limited immunotoxic potential of technical formulation of the herbicide atrazine (AAtrex) in mice

Lindane-induced immunological alterations in human poisoning cases

Linear immunoglobulin A bullous dermatosis induced by gemcitabine

Linear immunoglobulin A bullous dermatosis possibly induced by mefenamic acid

Links between prolonged exposure to xenobiotics, increased incidence of hepatopathies, immunological disturbances and exacerbation of latent Epstein-Barr virus infections

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Long-term exposure to PCB in broiler chickens--metabolic and immunotoxic effects

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Long-term immune dysfunction in rainbow trout (*Oncorhynchus mykiss*) exposed as embryos to aflatoxin B1

Long-term Immunotoxic Effects of Oral Prenatal and Neonatal Atrazine Exposure

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Long-Time Instead of Short-Time Exposure in Vitro and Administration in Vivo of Ochratoxin A Is Consistent in Immunosuppression

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Low dose exposure to cadmium and its health effects. (3) Toxicity in laboratory animals and cultured cells

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Low or excess levels of dietary cholesterol impaired immunity and aggravated inflammation response in young grass carp (*Ctenopharyngodon idella*)

Low-dose azathioprine effectively suppresses clinical and immunological manifestations of generalized myasthenia

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Low-dose inorganic mercury increases severity and frequency of chronic coxsackievirus-induced autoimmune myocarditis in mice

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Lower endotoxin immunity predicts increased cognitive dysfunction in elderly patients after cardiac surgery

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MAIT cells launch a rapid, robust and distinct hyperinflammatory response to bacterial superantigens and quickly acquire an anergic phenotype that impedes their cognate antimicrobial function: Defining a novel mechanism of superantigen-induced immunopathology and immunosuppression

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Malnutrition, urocanic acid, and sun may interact to suppress immunity in sojourners to high altitude

Mammalian immunoassays for predicting the toxicity of malathion in a laboratory fish model

Management of adverse events induced by next-generation immunomodulatory drug and proteasome inhibitors in multiple myeloma

Management of immune dysfunction after adult cardiac surgery

Managing immune checkpoint-inhibitor-induced severe autoimmune-like hepatitis by liver-directed topical steroids

Manganese tissue accumulation and tyrosine hydroxylase immunostaining response in the Neotropical freshwater crab, *Dilocarcinus pagei*, exposed to manganese

Manifestations of cellular immunity in the rat after prolonged asbestos inhalation. II. Alveolar macrophage-induced splenic lymphocyte proliferation

Markers for immunotoxic effects in rodents and man

Mast cells in the intestine and gills of the sea bream, *Sparus aurata*, exposed to a polychlorinated biphenyl, PCB 126

Mast cells mediate the immune suppression induced by dermal exposure to JP-8 jet fuel

Maternal adrenalectomy alters the immune and endocrine functions of fetal alcohol-exposed male offspring

Maternal and early postnatal polychlorinated biphenyl exposure in relation to total serum immunoglobulin concentrations in 6-month-old infants

Maternal exposure to airborne particulate matter causes postnatal immunological dysfunction in mice offspring

Maternal exposure to fish oil primes offspring to harbor intestinal pathobionts associated with altered immune cell balance

Maternal exposure to particulate matter alters early post-natal lung function and immune cell development

Maternal exposure to silver nanoparticles are associated with behavioral abnormalities in adulthood: Role of mitochondria and innate immunity in developmental toxicity

Maternal Immune Activation Causes Behavioral Impairments and Altered Cerebellar Cytokine and Synaptic Protein Expression

Maternal Lipopolysaccharide Exposure Promotes Immunological Functional Changes in Adult Offspring CD4+ T Cells

Maternal lipopolysaccharide-induced inflammation during pregnancy programs impaired offspring innate immune responses

Maternal obesity programs offspring nonalcoholic fatty liver disease by innate immune dysfunction in mice

Maternal separation in early life impairs tumor immunity in adulthood in the F344 rat

Maternal smoking is associated with impaired neonatal toll-like-receptor-mediated immune responses

Maternal transfer and sublethal immune system effects of brevetoxin exposure in nesting loggerhead sea turtles (*Caretta caretta*) from western Florida

Maternal undernutrition induces neuroendocrine immune dysfunction in male pups at weaning

Maternal-Fetal Cancer Risk Assessment of Ochratoxin A during Pregnancy

MDCO-216 Does Not Induce Adverse Immunostimulation, in Contrast to Its Predecessor ETC-216

Measurement of airborne flour exposure with a monoclonal antibody-based immunoassay

Measures of resting immune function and related physiology in juvenile rainbow trout exposed to a pulp mill effluent

Mechanical ventilation of healthy rats suppresses peripheral immune function

Mechanism of 7,12-dimethylbenz[a]anthracene-induced immunotoxicity: role of metabolic activation at the target organ

Mechanism of deoxynivalenol effects on the reproductive system and fetus malformation: Current status and future challenges

Mechanism of immunosuppression in zebrafish (*Danio rerio*) spleen induced by environmentally relevant concentrations of perfluorooctanoic acid

Mechanism of immunotoxicological effects of tributyltin chloride on murine thymocytes

Mechanism of perfluorooctanesulfonate (PFOS)-induced apoptosis in the immunocyte

Mechanism of systemic immune suppression by UV irradiation in vivo. II. The UV effects on number and morphology of epidermal Langerhans cells and the UV-induced suppression of contact hypersensitivity have different wavelength dependencies

Mechanism of TCDD-induced suppression of antibody production: effect on T cell-derived cytokine production in the primary immune reaction of mice

Mechanism of UVB-induced suppression of the immune response to *Mycobacterium bovis* bacillus Calmette-Guerin: role of cytokines on macrophage function

Mechanisms for how inhaled multiwalled carbon nanotubes suppress systemic immune function in mice

Mechanisms involved in the immunotoxicity induced by dermal application of JP-8 jet fuel

Mechanisms of 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin (HpCDD)-induced humoral immune suppression: evidence of primary defect in T-cell regulation

Mechanisms of dimethylbenzanthracene-induced immunotoxicity

Mechanisms of ethanol-induced immunosuppression

Mechanisms of immune dysfunction in stem cell transplantation

Mechanisms of immunotoxic effects of acrylonitrile

Mechanisms of organophosphorus pesticide toxicity in the context of airway hyperreactivity and asthma

Mechanisms underlying the suppression of established immune responses by ultraviolet radiation

Mechanisms underlying UV-induced immune suppression: implications for sunscreen design

Medical management and sublingual immunotherapy practices in patients with house dust mite-induced respiratory allergy: a retrospective, observational study

Melatonin alleviates aluminium chloride-induced immunotoxicity by inhibiting oxidative stress and apoptosis associated with the activation of Nrf2 signaling pathway

Melatonin ameliorates ochratoxin A-induced oxidative stress and apoptosis in porcine oocytes

Mercuric chloride induces a strong immune activation, but does not accelerate the development of dermal fibrosis in tight skin 1 mice

Mercury Accumulation, Structural Damages, and Antioxidant and Immune Status Changes in the Gilthead Seabream (*Sparus aurata* L.) Exposed to Methylmercury

Mercury and autoimmunity: implications for occupational and environmental health

Mercury compounds and the immune system: a review

Mercury exposure and children's health

Mercury Exposure and Heart Diseases

Mercury exposure in protein A immunoadsorption

Mercury exposure, serum antinuclear/antinucleolar antibodies, and serum cytokine levels in mining populations in Amazonian Brazil: a cross-sectional study

Mercury impairment of mouse thymocyte survival in vitro: involvement of cellular thiols

Mercury-induced autoimmune glomerulonephritis in inbred rats. II. Immunohistopathology, histopathology and effects of prostaglandin administration

Meropenem-induced immune thrombocytopenia and the diagnostic process of laboratory testing

Mesenteric lymph node T γ delta cells induced by gastrectomy in mice suppress cell-mediated immune response in vitro via released TGF- β

Metabolic and immune impairments induced by the endocrine disruptors benzo[a]pyrene and triclosan in *Xenopus tropicalis*

Metabolic and immunological disorders induced by long-term treatment with phenytoin

Metabolic pathways of ochratoxin A

Metabolic profiling study on potential toxicity and immunotoxicity-biomarker discovery in rats treated with cyclophosphamide using HPLC-ESI-IT-TOF-MS

Metabolic requirements for induction of contact hypersensitivity to immunotoxic polyaromatic hydrocarbons

Metabolic Syndrome after Hematopoietic Cell Transplantation: At the Intersection of Treatment Toxicity and Immune Dysfunction

Metabolism and toxicity of aflatoxins M1 and B1 in human-derived in vitro systems

Metabolite-specific (IgG) and drug-specific antibodies (IgG, IgM) in two cases of trimethoprim-sulfamethoxazole-induced immune thrombocytopenia

Metal allergens of growing significance: epidemiology, immunotoxicology, strategies for testing and prevention

Metal-induced impairment of the cellular immunity of newborn harbor seals (*Phoca vitulina*)

Metallothionein-null mice are highly susceptible to the hematotoxic and immunotoxic effects of chronic CdCl₂ exposure

Methamphetamine activates nuclear factor kappa-light-chain-enhancer of activated B cells (NF- κ B) and induces human immunodeficiency virus (HIV) transcription in human microglial cells

Methamphetamine induces trace amine-associated receptor 1 (TAAR1) expression in human T lymphocytes: role in immunomodulation

Method for evaluation of immunotoxicity of dioxin compounds using human T-lymphoblastic cell line, L-MAT

Methods for Analysis of Nanoparticle Immunosuppressive Properties In Vitro and In Vivo

Methods for Assessing Mast Cell Responses to Engineered Nanomaterial Exposure

Methotrexate-induced iatrogenic immunodeficiency-associated lymphoproliferative disorder causing hypercalcaemia

Methylenedioxymethamphetamine ('Ecstasy')-induced immunosuppression: a cause for concern

Methylmercury/copper effects on hemosiderin: possible mechanism of immune suppression in fish

Methylmercury-induced movement and postural disorders in developing rat: loss of somatostatin-immunoreactive interneurons in the striatum

Methylprednisolone-induced immune thrombocytopenia

Methylprednisolone-Induced Lymphocytosis in Patients with Immune-Mediated Inflammatory Disorders

Mice repeatedly exposed to Group-A beta-Haemolytic Streptococcus show perseverative behaviors, impaired sensorimotor gating, and immune activation in rostral diencephalon

Mice with genetically determined high susceptibility to ultraviolet (UV)-induced immunosuppression show enhanced UV carcinogenesis

Microbial Degradation of Cellular Kinases Impairs Innate Immune Signaling and Paracrine TNFalpha Responses

Microcystin-LR exposure to adult zebrafish (*Danio rerio*) leads to growth inhibition and immune dysfunction in F1 offspring, a parental transmission effect of toxicity

Microcystin-LR Induced Immunotoxicity in Mammals

Microcystin-LR induces cytotoxicity and affects carp immune cells by impairment of their phagocytosis and the organization of the cytoskeleton

Microcystin-LR modulates selected immune parameters and induces necrosis/apoptosis of carp leucocytes

Microcystin-LR toxicodynamics, induced pathology, and immunohistochemical localization in livers of blue-green algae exposed rainbow trout (*Oncorhynchus mykiss*)

Microgravity inhibits resting T cell immunity in an exposure time-dependent manner

Micronized, Heat-Treated *Lactobacillus plantarum* LM1004 Alleviates Cyclophosphamide-Induced Immune Suppression

Micronutrient deficiencies are associated with impaired immune response and higher burden of respiratory infections in elderly Ecuadorians

MicroRNA-155 and microRNA-181a, via HO-1, participate in regulating the immunotoxicity of cadmium in the kidneys of exposed *Cyprinus carpio*

Microsomal epoxide hydrolase is required for 7,12-dimethylbenz[a]anthracene (DMBA)-induced immunotoxicity in mice

Midazolam impairs immune functions: it's time to take care of dendritic cells

Miliary *Mycobacterium bovis* induced by intravesical bacille Calmette-Guerin immunotherapy

Minimal immunological changes in structurally malformed rats after prenatal exposure to cyclophosphamide

Minimal immunological effects on workers with prolonged low exposure to inorganic mercury

Minimum doses of ultraviolet radiation required to induce murine skin edema and immunosuppression are different and depend on the ultraviolet emission spectrum of the source

Minocycline-induced immune thrombocytopenia presenting as Schamberg's disease

Minor effects of low exposure to inorganic mercury on the human immune system

MiR-122 partly mediates the ochratoxin A-induced GC-2 cell apoptosis

MiR-582-5p/miR-590-5p targeted CREB1/CREB5-NF-kappaB signaling and caused opioid-induced immunosuppression in human monocytes

Misoprostol impairs female reproductive tract innate immunity against *Clostridium sordellii*

Mitigation of Hydrophobicity-Induced Immunotoxicity by Sugar Poly(orthoesters)

Mitochondrial functions of THP-1 monocytes following the exposure to selected natural compounds

Mitochondrial peroxiredoxin 3 (Prx3) from rock bream (*Oplegnathus fasciatus*): immune responses and role of recombinant Prx3 in protecting cells from hydrogen peroxide induced oxidative stress

Mitotic activity of keratinocytes in nifedipine- and immunosuppressive medication-induced gingival overgrowth

Mixed mold mycotoxicosis: immunological changes in humans following exposure in water-damaged buildings

MNU-induced rat mammary carcinomas: immunohistology and estrogen receptor expression

Modeling and predicting immunological effects of chemical stressors: characterization of a quantitative biomarker for immunological changes caused by atrazine and ethanol

Modeling the Function of TATA Box Binding Protein in Transcriptional Changes Induced by HIV-1 Tat in Innate Immune Cells and the Effect of Methamphetamine Exposure

Modeling toxicodynamic effects of trichloroethylene on liver in mouse model of autoimmune hepatitis

Modelling the immunopathophysiology of *Brucella melitensis* and its lipopolysaccharide in mice infected via oral route of exposure

Moderate prenatal alcohol exposure suppresses the TLR4-mediated innate immune response in the hippocampus of young rats

Modification of immunoreactive EGF and EGF receptor after acute tubular necrosis induced by tobramycin or cisplatin

Modification of primary amines to higher order amines reduces in vivo hematological and immunotoxicity of cationic nanocarriers through TLR4 and complement pathways

Modifications of immunological and neuro-endocrine parameters induced by antiorthostatic bed-rest in human healthy volunteers

Modifications of neuronal phosphorylated tau immunoreactivity induced by NMDA toxicity

Modulating effect of MgO-SiO₂ nanoparticles on immunological and histopathological alterations induced by aflatoxicosis in rats

Modulation of benzo[a]pyrene induced immunotoxicity in mice actively immunized with a B[a]P-diphtheria toxoid conjugate

Modulation of benzo[a]pyrene induced neurotoxicity in female mice actively immunized with a B[a]P-diphtheria toxoid conjugate

Modulation of biochemical parameters by *Hemidesmus indicus* in cumene hydroperoxide-induced murine skin: possible role in protection against free radicals-induced cutaneous oxidative stress and tumor promotion

Modulation of immune and antioxidant responses by azinphos-methyl in the freshwater mussel *Diplodon chilensis* challenged with *Escherichia coli*

Modulation of immune response by organophosphorus pesticides: fishes as a potential model in immunotoxicology

Modulation of immune responses with nanoparticles and reduction of their immunotoxicity

Modulation of immune-associated parameters and antioxidant responses in the crab (*Scylla serrata*) exposed to mercury

Modulation of macrophage activation by ammonium metavanadate

Modulation of murine peritoneal macrophage function by chronic exposure to arsenate in drinking water

Modulation of N-methyl-N-nitrosourea-induced crypt restricted metallothionein immunopositivity in mouse colon by a non-genotoxic diet-related chemical

Modulation of signal transduction pathways in lymphocytes due to sub-lethal toxicity of chlorinated phenol

Modulation of T-helper cell populations: potential mechanisms of respiratory hypersensitivity and immune suppression

Modulatory efficacy of green tea polyphenols on glycoconjugates and immunological markers in 4-Nitroquinoline 1-oxide-induced oral carcinogenesis-A therapeutic approach

Modulatory role of dietary *Chlorella vulgaris* powder against arsenic-induced immunotoxicity and oxidative stress in Nile tilapia (*Oreochromis niloticus*)

Modulatory role of dietary *Thymus vulgaris* essential oil and *Bacillus subtilis* against thiamethoxam-induced hepatorenal damage, oxidative stress, and immunotoxicity in African catfish (*Clarias garipenus*)

Modulatory role of L-carnitine against microcystin-LR-induced immunotoxicity and oxidative stress in common carp

Molecular and immune toxicity of CoCr nanoparticles in MoM hip arthroplasty

Molecular and immunological toxic effects of nanoparticles

Molecular cloning, immunohistochemical localization, characterization and expression analysis of caspase-8 from the blunt snout bream (*Megalobrama amblycephala*) exposed to ammonia

Molecular determinants of UV-induced immunosuppression

Molecular insight of arsenic-induced carcinogenesis and its prevention

Molecular mechanisms of amitraz mammalian toxicity: a comprehensive review of existing data

Molecular mechanisms underlying mancozeb-induced inhibition of TNF- α production

Monitoring antioxidant defenses and free radical production in space-flight, aviation and railway engine operators, for the prevention and treatment of oxidative stress, immunological impairment, and premature cell aging

Monitoring of azathioprine-induced immunosuppression with thiopurine methyltransferase activity in kidney transplant recipients

Monoclonal gammopathy after intense induction immunosuppression in renal transplant patients

Morphine impairs host innate immune response and increases susceptibility to *Streptococcus pneumoniae* lung infection

Morphine induced, behavioural, biochemical and immunological correlations

Morphine or U-50,488 suppresses Fos protein-like immunoreactivity in the spinal cord and nucleus tractus solitarius evoked by a noxious visceral stimulus in the rat

Morphological alteration, lysosomal membrane fragility and apoptosis of the cells of Indian freshwater sponge exposed to washing soda (sodium carbonate)

Morphological analysis of glomerular lesions in renal transplants immunosuppressed with cyclosporine A (CYA): has CYA induced a new transplant glomerular lesion

Morphological and immunobiochemical analysis of the liver in L-arginine induced experimental chronic pancreatitis

Morphological and immunohistochemical changes on rat skin exposed to nitrogen mustard

Morphological and immunohistochemical characteristics of the thymus during chemical carcinogenesis induced by 1,2-dimethylhydrazine administration

Morphological and immunohistochemical studies on porcine serum-induced rat liver fibrosis

Morphological changes in the thyroid and adrenals under the bitemporal action of a UHF electrical field and decimeter waves (experimental research).

Morphological features of the organs of the immune system in conditions of exposure to chromium and benzene

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Mouse lung immune response after acute exposure to flour dust

Moxifloxacin as the likely cause of drug-induced linear immunoglobulin A bullous dermatosis

Mucosal-associated invariant T cells from patients with tuberculosis exhibit impaired immune response

Multilaboratory evaluation of 15 bioassays for (eco)toxicity screening and hazard ranking of engineered nanomaterials: FP7 project NANOVALID

Multiorgan failure induced by intravenous immunoglobulin

Multiparametric immunotoxicity screening in mice during early drug development

Multiple biomarkers of the cytotoxicity induced by BDE-47 in human embryonic kidney cells

Multiple enlarged metabolically active lymph nodes in 18F-FDG PET/CT after anti-CTLA-4 antibody therapy in metastatic melanoma - disease progression or immunologically induced side effect

Multiple experimental approaches of immunotoxic effects of mercury chloride in the blue mussel, *Mytilus edulis*, through in vivo, in tubo and in vitro exposures

Multiple myeloma: clusters, clues, and dioxins

Murine membranous nephropathy: immunization with alpha3(IV) collagen fragment induces subepithelial immune complexes and FcgammaR-independent nephrotic syndrome

Murine model of ethanol-induced immunosuppression

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Myasthenia triggered by immune checkpoint inhibitors: New case and literature review

Mycobacterium infection from a cardiopulmonary bypass heater-cooler unit in a patient with steroid-induced immunosuppression

Mycobiota and Ochratoxin A in laboratory mice feed: preliminary study

Mycolactone-producing *Mycobacterium marinum* infection in captive Hong Kong warty newts and pathological evidence of impaired host immune function

Mycophenolate mofetil and reduced doses of cyclosporine in pediatric liver transplantation with chronic renal dysfunction: changes in the immune responses

Mycophenolate mofetil-based calcineurin inhibitor reduced immunosuppressive protocol for the improvement of renal dysfunction after liver transplantation

Mycophenolate mofetil-based, cyclosporine-free induction and maintenance immunosuppression: first-3-months analysis of efficacy and safety in two cohorts of renal allograft recipients

Mycotoxicoeses in children

Mycotoxins, general view, chemistry and structure

Myeloid-derived suppressor cells accumulate in the liver site after sepsis to induce immunosuppression

N,N,-diethyl-m-toluamide (DEET) suppresses humoral immunological function in B6C3F1 mice

Nanomaterial Exposure Induced Neutrophil Extracellular Traps: A New Target in Inflammation and Innate Immunity

Nanomaterial Induced Immune Responses and Cytotoxicity

Nanoparticles of zinc oxide defeat chlorpyrifos-induced immunotoxic effects and histopathological alterations

Nanosafety studies of nanomaterials about biodistribution and immunotoxicity

Natural killer activity in Fischer-344 rat lungs as a method to assess pulmonary immunocompetence: immunosuppression by phosgene inhalation

Naturally occurring level of mixed aflatoxins B and G stimulate toll-like receptor-4 in bovine mononuclear cells

Necrotizing Autoimmune myopathy: A case report on statin induced rhabdomyolysis requiring immunosuppressive therapy

Negative effect of chronic cadmium exposure on growth, histology, ultrastructure, antioxidant and innate immune responses in the liver of zebrafish: Preventive role of blue light emitting diodes

Neonatal exposure to mild hyperoxia causes persistent increases in oxidative stress and immune cells in the lungs of mice without altering lung structure

Neonatal exposure to UVR alters skin immune system development, and suppresses immunity in adulthood

Neonatal phytoestrogen exposure alters oviduct mucosal immune response to pregnancy and affects preimplantation embryo development in the mouse

Neonicotinoid-induced pathogen susceptibility is mitigated by *Lactobacillus plantarum* immune stimulation in a *Drosophila melanogaster* model

Nerve growth factor produced by activated human monocytes/macrophages is severely affected by ethanol

Neurodegeneration Triggers Peripheral Immune Cell Recruitment into the Forebrain

Neurodevelopmental disorders: Impaired immune system function linked to social behaviour deficits in mice

Neuroendocrine and Eosinophilic Granule Cells in the Gills of Tilapia, *Oreochromis niloticus*: Effects of Waterborne Copper Exposure

Neuroendocrine and immunotoxicity of polyaromatic hydrocarbon, chrysene in crustacean post larvae

Neuro-immune interactions in psychopathology with the example of interferon-alpha-induced depression

Neurologic and immunologic effects of exposure to corticosterone, chlorpyrifos, and multiple doses of tri-ortho-tolyl phosphate over a 28-day period in rats

Neuro-Modulation of Immuno-Endocrine Response Induced by Kalitoxin of *Androctonus* Scorpion Venom

Neuron specific enolase (NSE) immunostaining detection of endocrine cell hyperplasia in adult rats exposed to asbestos

Neuron-immune interactions in the sensitized thalamus induced by mustard oil application to rat molar pulp

Neuropathophysiological effect and immuno-inflammatory response induced by kalitoxin of *androctonus* scorpion venom

Neurophysiological, histological and immunohistochemical characterization of bortezomib-induced neuropathy in mice

Neurotoxic Anatoxin-a Can Also Exert Immunotoxicity by the Induction of Apoptosis on *Carassius auratus* Lymphocytes in vitro When Exposed to Environmentally Relevant Concentrations

Neurotoxic and immunotoxic effects of fenthion and omethoate on frogs at acute exposure

Neurotoxic and immunotoxic effects of Indole-3-butyric acid on rats at subacute and subchronic exposure

Neurotoxic effects of ochratoxin A on the subventricular zone of adult mouse brain

Neurotoxicity and immunotoxicity assessment in CBA/J mice with chronic *Toxoplasma gondii* infection and multiple oral exposures to methylmercury

Neurotoxicity and immunotoxicity assessment in CBA/J mice with chronic *Toxoplasma gondii* infection and single-dose exposure to methylmercury

Neurotoxicity of toluene

Neutralizing antibodies obtained in a persistent immune response are effective against deleterious effects induced by the *Thalassophryne nattereri* fish venom

Neutrophil depletion during *Toxoplasma gondii* infection leads to impaired immunity and lethal systemic pathology

Neutrophil function after exposure to polychlorinated biphenyls in vitro

Neutrophil protease inhibition reduces neuromyelitis optica-immunoglobulin G-induced damage in mouse brain

New insights into the mechanisms of polymorphic light eruption: resistance to ultraviolet radiation-induced immune suppression as an aetiological factor

New mechanism of organophosphorus pesticide-induced immunotoxicity

NF-kappaB activation via MyD88-dependent Toll-like receptor signaling is inhibited by trichothecene mycotoxin deoxynivalenol

Nickel - role in human organism and toxic effects

Nicotinamide reduces photodynamic therapy-induced immunosuppression in humans

Nitric oxide appears to be a mediator of solar-simulated ultraviolet radiation-induced immunosuppression in humans

Nitric oxide synthase immunolocalization and expression in the rat hippocampus after sub-acute lead acetate exposure in rats

Nitric oxide synthase inhibitor, aminoguanidine reduces intracerebroventricular colchicine induced neurodegeneration, memory impairments and changes of systemic immune responses in rats

Nitrofurantoin-induced immune-mediated lung and liver disease

Nivolumab-induced acute-onset type 1 diabetes mellitus as an immune-related adverse event: A case report

Nivolumab-Induced Subcutaneous Fat Necrosis: Another FDG-Avid Immune-Related Adverse Event

Nivolumab-induced type 1 diabetes mellitus as an immune-related adverse event

Non-analgesic effects of opioids: mechanisms and potential clinical relevance of opioid-induced immunodepression

Noncardiogenic pulmonary edema triggered by intravenous immunoglobulin in cancer-associated thrombotic thrombocytopenic purpura-hemolytic uremic syndrome

Nonclinical regulatory immunotoxicity testing of nanomedicinal products: Proposed strategy and possible pitfalls

Non-coplanar PCB-mediated modulation of human leukocyte phagocytosis: a new mechanism for immunotoxicity

Non-coplanar polychlorinated biphenyl (PCB)-induced immunotoxicity is coincident with alterations in the serotonergic system

Non-cytotoxic hydroxyl-functionalized exfoliated boron nitride nanoflakes impair the immunological function of insect haemocytes in vivo

Non-immunologic factor: immunosuppressive drug-induced nephrotoxicity

Normal development of tyrosine hydroxylase and serotonin immunoreactive fibers innervating anterior cingulate cortex and visual cortex in rabbits exposed prenatally to cocaine

Normalizing effect of plant-originated glycoprotein (116 kDa) on G0/G1 arrest in cadmium chloride-induced primary cultured mouse myelocytes

Novel Acaricidal Drug Fluazuron Causes Immunotoxicity via Selective Depletion of Lymphocytes T CD8

Novel Approach in Monocyte Intracellular TNF Measurement: Application to Sepsis-Induced Immune Alterations

Novel biomarkers of mercury-induced autoimmune dysfunction: a cross-sectional study in Amazonian Brazil

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Novel evidence of microglial immune response in impairment of Dengue infection of CNS

Novel gene markers of immunosuppressive chemicals in mouse lymph node assay

Novel mechanisms of gliadin immunotoxicity

Novel Use of All-Trans-Retinoic Acid in A Model of Lipopolysaccharide-Immunosuppression to Decrease the Generation of Myeloid-Derived Suppressor Cells by Reducing the Proliferation of CD34+ Precursor Cells

Nrf2 Regulates the Risk of a Diesel Exhaust Inhalation-Induced Immune Response during Bleomycin Lung Injury and Fibrosis in Mice

Nrf2-dependent repression of interleukin-12 expression in human dendritic cells exposed to inorganic arsenic

Nutritional aspects of immunosuppression in athletes

O(6)-benzylguanine enhances the in vitro immunotoxic activity of temozolomide on natural or antigen-dependent immunity

Obesity impairs cell-mediated immunity during the second trimester of pregnancy

Obesity is associated with impaired immune response to influenza vaccination in humans

Obesity: influenza immunity impaired in obesity

Obesity-induced tissue free radical generation: an in vivo immuno-spin trapping study

Occupational exposure to formaldehyde and early biomarkers of cancer risk, immunotoxicity and susceptibility

Occurrences and Outcomes of Immune Checkpoint Inhibitors-Induced Vitiligo in Cancer Patients: A Retrospective Cohort Study

Ochratoxin A exerts neurotoxicity in human astrocytes through mitochondria-dependent apoptosis and intracellular calcium overload

Ochratoxin A exposure biomarkers in the Czech Republic and comparison with foreign countries

Ochratoxin A from a toxicological perspective

Ochratoxin A induces nephrotoxicity and immunotoxicity through different MAPK signaling pathways in PK15 cells and porcine primary splenocytes

Ochratoxin A induces oxidative DNA damage and G1 phase arrest in human peripheral blood mononuclear cells in vitro

Ochratoxin a inhibits mouse embryonic development by activating a mitochondrion-dependent apoptotic signaling pathway

Ochratoxin A inhibits the production of tissue factor and plasminogen activator inhibitor-2 by human blood mononuclear cells: another potential mechanism of immune-suppression

Ochratoxin A: developmental and reproductive toxicity-an overview

Ochratoxin a: its cancer risk and potential for exposure

Ochratoxin A: previous risk assessments and issues arising

Ochratoxin A: the continuing enigma

Ochratoxin A: Toxicity, oxidative stress and metabolism

Ofloxacin eyedrops-induced toxic epidermal necrolysis treated with intravenous immunoglobulin

Oil mist exposure in industrial health--a review

OKT3 induction and steroid-free maintenance immunosuppression for treatment of high-risk heart transplant recipients

Omalizumab pretreatment decreases acute reactions after rush immunotherapy for ragweed-induced seasonal allergic rhinitis

Omics analysis of low dose acetaminophen intake demonstrates novel response pathways in humans

On the long-term effects of methyl isocyanate on cell-mediated immunity in Bhopal gas-exposed long-term survivors and their offspring

O-phenylphenol and its sodium and potassium salts: a toxicological assessment

Opioid-Induced Hyperalgesia Is Associated with Dysregulation of Circadian Rhythm and Adaptive Immune Pathways in the Mouse Trigeminal Ganglia and Nucleus Accumbens

Opioid-induced immunosuppression

Opioid-induced immunosuppression. A clinically relevant problem

Opioid-induced immunosuppression: is it centrally mediated or peripherally mediated

Opposite effects of the maternal immune system activated by interleukin-1beta vs. PSK and OK432 on 5-azacytidine-induced birth defects

Optimal immunosuppressor induces stable gut microbiota after liver transplantation

Options for induction immunosuppression in liver transplant recipients

Oral (gavage), in utero and postnatal exposure of Sprague-Dawley rats to low doses of tributyltin chloride. Part 1: Toxicology, histopathology and clinical chemistry

Oral (gavage), in utero and post-natal exposure of Sprague-Dawley rats to low doses of tributyltin chloride. Part II: effects on the immune system

Oral administration of lipoteichoic acid from *Lactobacillus rhamnosus* GG overcomes UVB-induced immunosuppression and impairs skin tumor growth in mice

Oral administration of the immunomodulator JBT-3002 induces endogenous interleukin 15 in intestinal macrophages for protection against irinotecan-mediated destruction of intestinal epithelium

Oral benzo[a]pyrene: understanding pharmacokinetics, detoxication, and consequences--Cyp1 knockout mouse lines as a paradigm

Oral Exposure to Atrazine Induces Oxidative Stress and Calcium Homeostasis Disruption in Spleen of Mice

Oral exposure to benzo[a]pyrene in the mouse: detoxication by inducible cytochrome P450 is more important than metabolic activation

Oral exposure to immunostimulating drugs results in early changes in innate immune parameters in the spleen

Oral exposure to inorganic mercury alters T lymphocyte phenotypes and cytokine expression in BALB/c mice

Oral exposure to mineral oils: Is there an association with immune perturbation and autoimmunity

Oral exposure to the herbicide simazine induces mouse spleen immunotoxicity and immune cell apoptosis

Oral mucosal changes induced by anticancer targeted therapies and immune checkpoint inhibitors

Organization of research team for nano-associated safety assessment in effort to study nanotoxicology of zinc oxide and silica nanoparticles

Organochlorine compounds: Risk of non-Hodgkin's lymphoma and breast cancer

Organochlorine contaminant exposure and associations with hematological and humoral immune functional assays with dam age as a factor in free-ranging northern fur seal pups (*Callorhinus ursinus*)

Organochlorine pesticide-induced oxidative stress and immune suppression in rats

Organochlorine pollutants [corrected] in California sea lions revisited

Organophosphorus pesticide immunotoxicity: effects of O,O,S-trimethyl phosphorothioate on cellular and humoral immune response systems

Organotins disrupt the 11 β -hydroxysteroid dehydrogenase type 2-dependent local inactivation of glucocorticoids

Oxaliplatin Immune-Induced Syndrome Occurs With Cumulative Administration and Rechallenge: Single Institution Series and Systematic Review Study

Oxaliplatin induces a delayed immune-mediated hemolytic anemia: a case report and review of the literature

Oxaliplatin-induced hypersensitivity reaction displaying marked elevation of immunoglobulin E

Oxaliplatin-induced immune pancytopenia

Oxaliplatin-induced immune thrombocytopenia

Oxaliplatin-induced immune thrombocytopenia in a patient with colon cancer

Oxazolone-Induced Colitis as a Model of Th2 Immune Responses in the Intestinal Mucosa

Oxcarbazepine-induced immunoglobulin deficiency

Oxidative damage and immunotoxicity effect of people who exposed to electronic waste

Oxidative stress and apoptotic changes in murine splenocytes exposed to cadmium

Oxidative stress and immune disturbance after long-term exposure to bisphenol A in juvenile common carp (*Cyprinus carpio*)

Oxidative stress and immunotoxic effects of bisphenol A on the larvae of rare minnow *Gobiocypris rarus*

Oxidative stress and immunotoxic effects of lead and their amelioration with myrrh (*Commiphora molmol*) emulsion

Oxidative stress and immunotoxicity induced by graphene oxide in zebrafish

Oxidative stress, immunological response, and heat shock proteins induction in the Chinese Mitten Crab, *Eriocheir sinensis* following avermectin exposure

Oxidative stress, ion concentration change and immune response in gills of common carp (*Cyprinus carpio*) under long-term exposure to bisphenol A

Oxidative stress, neurotoxicity, and non-specific immune responses in juvenile red sea bream, *Pagrus major*, exposed to different waterborne selenium concentrations

Oxidative stress-induced skeletal muscle injury involves in NF-kappaB/p53-activated immunosuppression and apoptosis response in copper (II) or/and arsenite-exposed chicken

Oxidized lipid depresses canine growth, immune function, and bone formation

Oxidized phospholipid, 1-palmitoyl-2-(9'-oxo-nonanoyl)-glycerophosphocholine (PON-GPC), produced in the lung due to cigarette smoking, impairs immune function in macrophages

Ozone exposure impairs antigen-specific immunity but activates IL-7-induced proliferation of CD4-CD8-thymocytes in BALB/c mice

p38 mitogen-activated protein kinase impairment of innate immune cells is a characteristic feature of HBeAg-negative chronic hepatitis B

p53 and ATM/ATR regulate 7,12-dimethylbenz[a]anthracene-induced immunosuppression

Pact with the devil: alemtuzumab therapy, immune suppression and infectious complications in chronic lymphocytic leukemia

Palivizumab is highly effective in suppressing respiratory syncytial virus in an immunosuppressed animal model

Panitumumab-Induced Immune Complex Glomerulonephritis

Paper and pulp mill effluent-induced immunotoxicity in freshwater fish *Channa punctatus* (Bloch)

Parameters of immunological competence in subjects with high consumption of fish contaminated with persistent organochlorine compounds

Paraquat Preferentially Induces Apoptosis of Late Stage Effector Lymphocyte and Impairs Memory Immune Response in Mice

Parasitism and venom of ectoparasitoid *Scleroderma guani* impairs host cellular immunity

Parathion-induced suppression of humoral immunity in inbred mice

Pargyline pretreatment prevents immunological changes induced by MPTP in mice

Partial regression of Merkel cell carcinoma in response to withdrawal of azathioprine in an immunosuppression-induced case of metastatic Merkel cell carcinoma

Past, present and emerging toxicity issues for jet fuel

Pathogenesis of trehalose dimycolate-induced interstitial pneumonitis. IV. Evidence against roles for immunoglobulins and the complement system

Pathogenetic analyses of carbamazepine-induced liver injury in F344 rats focused on immune- and inflammation-related factors

Pathological damage and immunomodulatory effects of zebrafish exposed to microcystin-LR

Pathological findings in rabbits and sheep following the subacute administration of triphenyltin acetate

Pathological, immunological and biochemical markers of subchronic arsenic toxicity in rats

Pathophysiologic and immunologic mechanisms of contrast medium-induced anaphylactoid immediate hypersensitivity--an overview

Patients with quinine-induced immune thrombocytopenia have both "drug-dependent" and "drug-specific" antibodies

Patterns of immunotoxicity associated with chronic as compared with acute exposure to chemical or physical stressors and their relevance with regard to the role of stress and with regard to immunotoxicity testing

Patulin immunotoxicology: effect on phagocyte activation and the cellular and humoral immune system of mice and rabbits

Pb exposure attenuates hypersensitivity in vivo by increasing regulatory T cells

PCB 28 metabolites elimination kinetics in human plasma on a real case scenario: Study of hydroxylated polychlorinated biphenyl (OH-PCB) metabolites of PCB 28 in a highly exposed German Cohort

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Peculiarities of immunologic reactivity in workers exposed to various neurotoxic chemicals

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Pefloxacin and ciprofloxacin increase UVA-induced edema and immune suppression

Pegylated interferon-induced immune-mediated hepatitis post-liver transplantation

PEGylation is effective in reducing immunogenicity, immunotoxicity, and hepatotoxicity of alpha-momorcharin in vivo

Pembrolizumab-Induced Encephalopathy: A Review of Neurological Toxicities with Immune Checkpoint Inhibitors

Pembrolizumab-Induced Extensive Panniculitis and Nevus Regression: Two Novel Cutaneous Manifestations of the Post-immunotherapy Granulomatous Reactions Spectrum

Pembrolizumab-triggered Uveitis: An Additional Surrogate Marker for Responders in Melanoma Immunotherapy

Penicillinase-resistant antibiotics induce non-immune-mediated cholestasis through HSP27 activation associated with PKC/P38 and PI3K/AKT signaling pathways

Penicillin-induced immune-mediated hemolytic anemia in a horse

Pentamidine-induced hyperglycemia and ketosis in acquired immunodeficiency syndrome

Pentosan-induced thrombocytopenia: support for an immune complex mechanism

Percutaneous interventions in patients with immune-mediated heparin-induced thrombocytopenia

Perfluorinated compounds and immunotoxicity in children

Perfluorinated compounds: emerging POPs with potential immunotoxicity

Perfluoroalkyl acids: a review of monitoring and toxicological findings

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Perinatal exposure of mice to TCDD decreases allergic sensitisation through inhibition of IL-4 production rather than T regulatory cell-mediated suppression

Perinatal exposure to a low dose of bisphenol A impaired systemic cellular immune response and predisposes young rats to intestinal parasitic infection

Perinatal exposure to insecticide methamidophos suppressed production of proinflammatory cytokines responding to virus infection in lung tissues in mice

Perinatal exposure to low doses of PCB 153 and PCB 126 affects maternal and neonatal immunity in goat kids

Perinatal TCDD exposure and the adult onset of autoimmune disease

Periodontitis induced by Porphyromonas gingivalis drives periodontal microbiota dysbiosis and insulin resistance via an impaired adaptive immune response

Perioperative agranulocytosis induced by immunosuppressants in a renal graft recipient : a case report

Perioperative recombinant human granulocyte colony-stimulating factor (Filgrastim) treatment prevents immunoinflammatory dysfunction associated with major surgery

Perioperative single high dose ATG-Fresenius S administration as induction immunosuppressive therapy in cadaveric renal transplantation--preliminary results

Perioperative supplementation of EPA reduces immunosuppression induced by postoperative chemoradiation therapy in patients with esophageal cancer

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Persistent hematologic and immunologic disturbances in 8-year-old Dutch children associated with perinatal dioxin exposure

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Possible association between the observed cyclosporine-induced upregulation of in vitro immune functions and posttransplantation lymphoproliferative disorders

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Recent advances in understanding the mechanisms of TCDD immunotoxicity

Recent studies on the effects of fetal alcohol exposure on the endocrine and immune systems

Recent US Food and Drug Administration warnings on hepatitis B reactivation with immune-suppressing and anticancer drugs: just the tip of the iceberg

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Subchronic effects of perfluorooctanesulfonate exposure on inflammation in adult male C57BL/6 mice

Subchronic exposures to fungal bioaerosols promotes allergic pulmonary inflammation in naive mice

Subchronic immunotoxicity and screening of reproductive toxicity and developmental immunotoxicity following single instillation of HIPCO-single-walled carbon nanotubes: purity-based comparison

Subchronic inhalation toxicity of isobutyl nitrite in BALB/c mice. II. Immunotoxicity studies

Subchronic inhalation toxicity of the chlorinated propane 1,1,1,3,3,3-hexachloropropane (HCC-230fa

Subchronic lead exposure, immunotoxicology and increased disease resistance in Japanese quail (*Coturnix coturnix japonica*)

Subchronic Oral Cadmium Exposure Exerts both Stimulatory and Suppressive Effects on Pulmonary Inflammation/Immune Reactivity in Rats

Subchronic oral toxicity study of furan in Fischer-344 rats

Subchronic toxicity and immunotoxicity of MeO-PEG-poly(D,L-lactic-co-glycolic acid)-PEG-OMe triblock copolymer nanoparticles delivered intravenously into rats

Sub-chronic toxicity of low concentrations of industrial volatile organic pollutants in vitro

Subchronic treatment with mercuric chloride suppresses immune response, elicits behavioral deficits and increases brain serotonin and dopamine metabolism in rats

Subchronic, reproductive, and maternal toxicity studies with tertiary butyl acetate (TBAC)

Subclinical doses of T-2 toxin impair acquired immune response and liver cytochrome P450 in pigs

Subclinical GvHD in non-irradiated F1 hybrids: severe lymphoid-tissue GvHD causing prolonged immune dysfunction

Subclinical Reactivation of Cytomegalovirus Drives CD4+CD28null T-Cell Expansion and Impaired Immune Response to Pneumococcal Vaccination in Antineutrophil Cytoplasmic Antibody-Associated Vasculitis

Sublethal hyperoxia impairs pulmonary innate immunity

Sublingual immunotherapy in children with grass pollen induced allergic rhinoconjunctivitis

Substance P as prophylaxis for JP-8 jet fuel-induced immunotoxicity

Successful combined treatment with rituximab and high dose immunoglobulin in a patient with chronic lymphocytic leukemia with fludarabine-induced severe immune thrombocytopenia

Successful intravenous human immunoglobulin treatment of drug-induced Stevens-Johnson syndrome in a dog

Successful Management by Immunoglobulin for Sunitinib-Induced Thrombocytopenia in a Patient with Advanced Metastatic Renal Cell Carcinoma

Successful management with intravenous immunoglobulins in alemtuzumab-induced acute inflammatory demyelinating neuropathy: clinical report of three patients

Successful treatment by voliconazole for pulmonary and adductor magnus muscle aspergillosis induced by immunosuppressive therapy for hypersensitivity pneumonia

Successful treatment of lymphoma with fludarabine combined with rituximab after immune thrombocytopenia induced by fludarabine

Successful treatment of recalcitrant penicillamine-induced pemphigus foliaceus by low-dose intravenous immunoglobulins

Successful Treatment of Severe Heparin-induced Thrombocytopenia with Intravenous Immunoglobulin, Platelet Transfusion and Rivaroxaban: A Case Report

Successfully treated sulphasalazine-induced fulminant hepatic failure, thrombocytopenia and erythroid hypoplasia with intravenous immunoglobulin

Sudden collapse during haemodialysis due to immune-mediated heparin-induced thrombocytopenia

Sulfamethoxazole-trimethoprim-induced pneumonitis in a patient with hemophilia B who was infected with the human immunodeficiency virus

Sulfasalazine induced immune thrombocytopenia in a patient with rheumatoid arthritis

Sulfasalazine-induced linear immunoglobulin A bullous dermatosis with DRESS

Sulindac-induced immune hemolytic anemia

Sulphonylurea usage in melioidosis is associated with severe disease and suppressed immune response

Sunlight-induced immunosuppression in humans is initially because of UVB, then UVA, followed by interactive effects

Sunscreen applied at 2 mg cm⁻² during a sunny holiday prevents erythema, a biomarker of ultraviolet radiation-induced DNA damage and suppression of acquired immunity

Sunscreen lotions prevent ultraviolet radiation-induced suppression of antitumor immune responses

Sunset yellow FCF, a permitted food dye, alters functional responses of splenocytes at non-cytotoxic dose

Superoxide dismutase 3 controls adaptive immune responses and contributes to the inhibition of ovalbumin-induced allergic airway inflammation in mice

Supplementing an immunomodulatory feed ingredient to modulate thermoregulation, physiologic, and production responses in lactating dairy cows under heat stress conditions

Suppressed T helper 2 immunity and prolonged survival of a nematode parasite in protein-malnourished mice

Suppression by Delta(9)-tetrahydrocannabinol of the primary immunoglobulin M response by human peripheral blood B cells is associated with impaired STAT3 activation

Suppression of allergen-induced airway inflammation and immune response by the peroxisome proliferator-activated receptor-alpha agonist fenofibrate

Suppression of allergic immune responses to house dust mite (HDM) in rats exposed to 2,3,7,8-TCDD

Suppression of allograft immunity by 3,4,5,3',4',5'-hexachlorobiphenyl. I. Effects of exposure on tumor rejection and cytotoxic T cell activity in vivo

Suppression of allograft immunity by 3,4,5,3',4',5'-hexachlorobiphenyl. II. Effects of exposure on mixed lymphocyte reactivity and induction of suppressor cell activity in vitro

Suppression of B-cell mediated immunity in juvenile chinook salmon (*Oncorhynchus tshawytscha*) after exposure to either a polycyclic aromatic hydrocarbon or to polychlorinated biphenyls

Suppression of cell-mediated immune responses to listeria infection by repeated exposure to diesel exhaust particles in brown Norway rats

Suppression of cell-mediated immunity by a donor-transmitted lymphocytic choriomeningitis virus in a kidney transplant recipient

Suppression of cell-mediated immunity following oral feeding of mice with palmyrah (*Borassus flabellifer* L) flour

Suppression of cellular immune responses in BALB/c mice following oral exposure to permethrin

Suppression of cellular immunity by anesthesia and operation

- Suppression of cellular immunity in men with a past history of posttraumatic stress disorder
- Suppression of corneal graft rejection in rabbits by a new immunosuppressive agent, FK-506
- Suppression of cyclosporine a nephrotoxicity in vivo by transforming growth factor beta receptor-immunoglobulin G chimeric protein
- Suppression of human B cell activation by 2,3,7,8-tetrachlorodibenzo-p-dioxin involves altered regulation of B cell lymphoma-6
- Suppression of humoral and cell-mediated immune responses by carbon tetrachloride
- Suppression of humoral and cell-mediated immune responses in vitro by benzo(a)pyrene
- Suppression of humoral immune responses by 2,3,7,8-tetrachlorodibenzo-p-dioxin intercalated in smectite clay
- Suppression of humoral immune responses by dialkyl nitrosamines: structure-activity relationships
- Suppression of humoral immunity by perfluorooctanoic acid is independent of elevated serum corticosterone concentration in mice
- Suppression of humoral immunity following exposure to the perfluorinated insecticide sulfluramid
- Suppression of humoral immunity in mice following exposure to perfluorooctane sulfonate
- Suppression of immune parameters in animal models of morphine dependence
- Suppression of immune response associated with functions of B-cells, Th1- and Th2-lymphocytes and interleukins produced by these cells, and pharmacological correction of these disturbances upon acute intoxication with methanol
- Suppression of immune response in the B6C3F1 mouse after dietary exposure to the Fusarium mycotoxins deoxynivalenol (vomitoxin) and zearalenone
- Suppression of immunoglobulin production by a novel dihydroorotate dehydrogenase inhibitor, S-2678
- Suppression of local gut-associated and splenic mitogen responsiveness of lymphoid cells following oral exposure of B6C3F1 mice to 7,12-dimethylbenz[a]anthracene
- Suppression of natural killer cells after acute intoxication with alcohols and cholinotropic preparations and their reactivation with T-activin
- Suppression of retrovirus-induced immunodeficiency disease (murine AIDS) by trimidox and didox: novel ribonucleotide reductase inhibitors with less bone marrow toxicity than hydroxyurea
- Suppression of splenic lymphocyte function by 7,12-dimethylbenz[a]anthracene (DMBA) in vitro
- Suppression of Th1- and Th2-type immune responses in infant mouse spleen after prenatal and postnatal exposure to low-level toluene and peptidoglycan
- Suppression of the IgM Response by Aryl Hydrocarbon Receptor Activation in Human Primary B Cells Involves Impairment of Immunoglobulin Secretory Processes

Suppression of the immune system by oral glucocorticoid therapy in bronchial asthma

Suppression of the in vitro humoral immune response by chrysotile asbestos

Suppression of the in vitro humoral immune response of mouse splenocytes by 7,12-dimethylbenz[a]anthracene metabolites and inhibition of immunosuppression by alpha-naphthoflavone

Suppression of the in vitro immune response by 7,12-dimethylbenz[a]anthracene in mouse splenocytes co-cultured with rat hepatocytes

Suppression of the NF-kappaB pathway by diesel exhaust particles impairs human antimycobacterial immunity

Suppressive Effect of 1alpha,25-Dihydroxyvitamin D3 on Th17-Immune Responses in Kidney Transplant Recipients With Tacrolimus-Based Immunosuppression

Suppressive effect of O,O-dimethyl, S-ethyl phosphorothioate on immune response

Suppressive effect of ultraviolet B radiation on contact sensitization in mice. II. Systemic immunosuppression is modulated by ultraviolet irradiation and hapten application

Suppressive effects of benzo[a]pyrene upon fish immune function: evolutionarily conserved cellular mechanisms of immunotoxicity

Suppressive effects of thiopental and halothane on specific arms of the immune response

Suppressor T-cell levels are unreliable indicators of the impaired immune response following thermal injury

Surface charges and shell crosslinks each play significant roles in mediating degradation, biofouling, cytotoxicity and immunotoxicity for polyphosphoester-based nanoparticles

Surface coatings determine cytotoxicity and irritation potential of quantum dot nanoparticles in epidermal keratinocytes

Surface expression of the hRSV nucleoprotein impairs immunological synapse formation with T cells

Surface functionalized mesoporous silica nanoparticles with natural proteins for reduced immunotoxicity

Surgery-induced immunomodulation in breast cancer

Surgery-induced immunosuppression and postoperative pain management

Surgical damage to the lymphatic system promotes tumor growth via impaired adaptive immune response

Susceptibility to secondary bacterial infections in growing pigs as an early response in ochratoxicosis

Sustained 3-year efficacy of pre- and coseasonal 5-grass-pollen sublingual immunotherapy tablets in patients with grass pollen-induced rhinoconjunctivitis

Swainsonine exposure induces impairment of host immune response in pregnant BALB/c mice

Swiss mice CD1 fed on mussels contaminated by okadaic acid and yessotoxins: effects on thymus and spleen

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Symptoms and immunologic markers induced by exposure to methyltetrahydrophthalic anhydride

Symptoms of atopy in persons exposed to chronic immunosuppression of polycyclic aromatic hydrocarbons

Synaptophysin immunoreactive axonal swelling in p-bromophenylacetylurea-induced neuropathy

Syndrome of cocaine-levamisole-induced cutaneous vasculitis and immune-mediated leukopenia

Synergism in immunotoxicological effects due to repeated combined administration of arsenic and lead in mice

Synergistic effect of organic solvents and tobacco smoke on serum immunoglobulin levels in humans

Synthesis and characterization of deoxynivalenol glucuronide: its comparative immunotoxicity with deoxynivalenol

Synthesis of zanthoxylamide protoalkaloids and their in silico ADME-Tox screening and in vivo toxicity assessment in zebrafish embryos

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Systemic immune cell response in rats after pulmonary exposure to manganese-containing particles collected from welding aerosols

Systemic immune challenges trigger and drive Alzheimer-like neuropathology in mice

Systemic immunosuppression following a single pharyngeal aspiration of 1,2:5,6-dibenzanthracene in female B6C3F1 mice

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Systemic immunotoxicity in AJ mice following 6-month whole body inhalation exposure to diesel exhaust

Systemic immunotoxicity reactions induced by adjuvanted vaccines

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T lymphocyte-proliferative responses of harbor seal (*Phoca vitulina*) peripheral blood mononuclear cells (PBMCs) exposed to pharmaceuticals in vitro

T-2 toxin immunotoxicity on human B and T lymphoid cell lines

T-2 toxin impairment of enteric reovirus clearance in the mouse associated with suppressed immunoglobulin and IFN-gamma responses

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Work stress and innate immune response

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A4-C. Bibliography – Low-Tech Factors that Strengthen Immune System

In the main text, two types of strategic treatments for a weakened immune system were defined: vaccine-based and non-vaccine-based. The vaccine-based treatments were addressed in [Appendix 3](#). The non-vaccine-based treatments were divided into two categories: identifying and eliminating factors that contribute to weakening the immune system, and adding factors that contribute to strengthening a weak immune system. Many factors of the first category were presented in [Tables A4-1 to A4-5](#). In the present section, some factors of the second category (especially low-tech factors that strengthen the immune system) will be presented in the form of a bibliography. Many more factors of this nature exist, and could be identified with a much larger study.

The bibliography follows. It consists of two alphabetized sections. The first group (on average) tends to cover broader issues, while the second group (on average) tends to focus on more specific issues. Many of the documents straddle both groups.

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